PEST CONTROL

JULY 1957

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A Handy "Check List" for Termite Treating Slab Homes . . . . . Pg. 36

●

Results of extensive laboratory and field experiments furnish the most dependable guide to the effectiveness of new insecticides. This month's cover picture, showing several glass containers with test roaches, was taken in the Savannah, Ga. laboratory of the Division of Stored Product Insect Investigations, U. S. Department of Agriculture. This is only one of the several Government stations where Federal researchers constantly probe the quality of new insecticides. For a complete story of 1956 insecticide experiments for the control of German roaches, written by three members of the USDA's Entomology Research Branch, Agricultural Research Service, see page 9.

Monthly Magazine of Methods, Chemicals, and Equipment for Urban and Industrial Pest Control and Sanitation Since 1933

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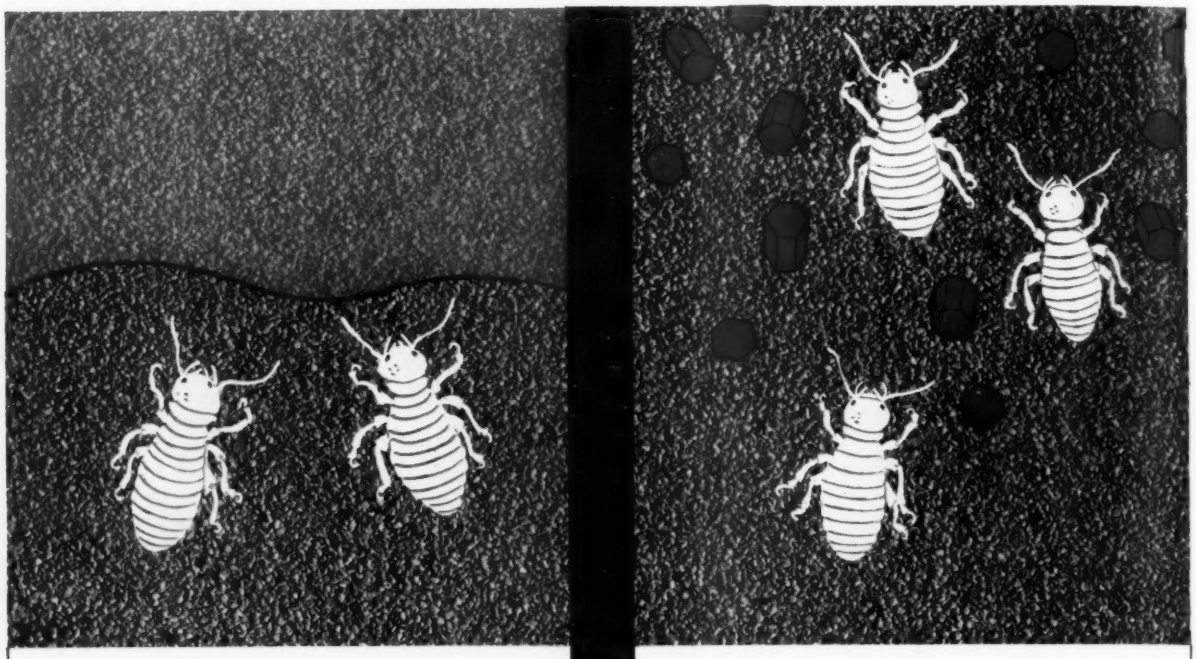

NON-CRYSTALLINE CHLORDANE PROTECTS ALL TREATED SOIL PARTICLES YEAR AFTER YEAR!

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How To Expand

Foster D. Snell, Inc., a testing laboratory service for improving old products or developing new ones, with headquarters at 30 West 15th Street, New York 11, N. Y., has just issued a booklet entitled, "How to Develop Successful New Products." You can obtain a copy free by writing the company.

Most of the Snell organization's recommendations on how manufacturers should go about developing new products are applicable to the pest control company that wants to increase profits by adding new services, maintain or increase its share of the market, or keep up with the ever changing demand for more PCO services.

Among the reported reasons top companies gave for some of the failures of their pet expansion ideas was a lack of well-thought-out marketing plans, a lack of market research, a lack of pre-testing. This makes good sense. PCOs need to find out for themselves whether or not a new service is really needed and if there is a sufficient market to make it profitable. After all, the major reason for any expansion move is to make more money.

How do you make a market analysis? Of course, one of the best ways is to hire a well-qualified market survey and testing firm. If you do not have funds for that, there are many things you can do for yourself. Ask your best customers for suggestions on how you can serve them better. What else would they like you to do?

Analyze your types of customers. Some will be growing, while others may be on the decline. Ask yourself these questions: What industries will use the new service? How much will they use it? What is the growth trend in each industry? Where are potential industries located? Are they within your economical scope of operation? How profitable would it be for you to expand into the contemplated service? Is it going to replace or supplement the service you already provide?

What about financing? Can you afford to promote the new service and stick with it until it wins customer acceptance? How soon will your competitors jump in with a like service? Can you price your new service competitively and recoup your investment with a reasonable profit? What new equipment will you need? Have you adequately pre-estimated your costs?

Yes, it's sound advice to explore an unfamiliar field before you enter it. "How to Develop Successful New Products" is packed with wisdom and sound counsel. We think you will benefit a great deal by using a copy as a guide before tackling any future diversifications or expansions.

PEST CONTROL

TWENTY MO... SINCE 1933

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Letters

With the first evidence of flooding in Texas early in May, the editors of Pest Control *contacted public health officials and PCOs in parts of the state directly affected for information on rodent, mosquito, and termite control problems arising out of high water conditions. Below are some of the replies we received. For a longer story on the Texas flood and its effect on rodent and mosquito populations in stricken sections,* *turn to page 44.*

Termite Infestation Up

After making some inquiries and observations, it is my opinion termite infestations have been on the increase the last few years, regardless of drought. Whether or not our recent floods have had any marked bearing, I am unable to say. Probably one of the factors is new construction, both industrial and residential, since the war. Each year we are finding more termite infestations in these new buildings.

The rodent problem has definitely been on the increase here in Dallas the last two or three weeks, particularly in industrial areas and downtown. However, we are not having any difficulty handling the situation.

The biggest problem we have at the moment is our inability to make termite inspections; at least 75% of the homes have water under them. We are hoping this situation soon clears. That doesn't mean, of course, business is at a standstill. Crews are going from early until late six days a week and have been for some six or eight weeks now.

Quite frequently to keep the customer happy, we even go out and spray the indoor swarmers until we can do a permanent job.

Ruby E. Abel

Abel Exterminating Company
Dallas

Employ DDT, Diesel Oil

For the past month heavy rains have been falling, but we did not have any major flooding until the week end of May 25. In these flooded areas, we are using DDT and diesel oil for larvicide work. Both power and hand spraying equipment is being used, and we are also fogging these areas in the evening. At the present time, we are trying to obtain a Buffalo Turbine to begin dusting with 3% BHC dust.

Roy A. Adams

Sanitary Engineer
City of Fort Worth

Rodents Under Control

I'm afraid I don't have much to report to you except that the pest control operators in the state have the rats under such good control there have been no problems arising from the many floods and tornadoes that have stricken our area.

Mosquitoes threaten to become a nuisance in several places, but they seem to be under control by quick action of the local public health officials and fogging operators. It has not been necessary to make a large-scale organized effort and it probably won't be since local agencies have the situation under control.

With all modesty, I think it is really something to be proud of to report so little trouble.

Harlan K. Baker

International Exterminator Corporation
Fort Worth

No Flooding Here

We sho nuff' don't have any floods in the Texas Panhandle. We had a little rain, but not even enough of that (2″). The floods were down in deep Texas: Waco, Fort Worth, Dallas — many miles from us. Texas is a big state, you know.

Jack C. Wyatt

Health Department
Amarillo

Defines Flood Boundaries

While the weather in the western portion of Texas has been unusual, to say the least, we have

(Continued on page 46)

Pest Control welcomes expressions of opinions from its readers. Send ideas and comments as briefly as possible to James A. Nelson, Editor, Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Mosquito

Fly

Roach

Malathion controls "resistant" insects

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REPORT

NUMBER 2

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OUTDOOR

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Dust

Use 5% MALRIN DUST in hand or power dusters and treat areas as above.

INDOOR

Wet Spray Use oil or water base MALRIN, 1 gallon to 25 gallons of diluent. Treat infested areas thoroughly.

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Experiments with Insecticides for the control of German Roaches[1]

By CLIFFORD LOFGREN, G. S. BURDEN, and P. H. CLARK, Entomology Research Branch, A.R.S., U. S. Dept. of Agriculture

THE WIDESPREAD development of chlordane resistance by the German cockroach (**Blattella germanica** (L.)) and the recent discovery of pyrethrum resistance in this species have made it necessary to increase efforts to find suitable insecticides for its control (Keller **et al.** 1956 **a** and **b**).

During the last few years a number of phosphorus insecticides have been tested. Bedingfield (1955) reported success with Malrin, Chlorthion and Dipterex in Texas. Laake (1955) reported similar results with Malrin and Chlorthion. Wright and Wright (1955) obtained control of heavy infestations with Malrin, using one to three monthly treatments with emulsion sprays and one to five applications with oil-base sprays. More recently Diazinon has shown promise for roach control (Alexander 1955, Bedingfield 1956). Keller **et al.** (1956a) found malathion, Diazinon, and Bayer L 13/59 (Dipterex) to be effective against **Periplaneta** spp. for four to seven weeks; Am. Cyanamid 4124 and Chlorthion were slightly less effective.

This paper describes tests conducted during 1956 to (1) determine how widespread German roach resistance to chlordane is in an area not receiving regular pest control service, (2) compare several insecticides in the field as residual sprays or dusts for control of German roaches and (3) determine the residual persistence of six phosphorus insecticides and chlordane when aged under field conditions.

Resistance to Chlordane

During the spring and summer, 28 collections of German roaches were made in homes in substandard areas of Orlando, Florida. Susceptibility of male roaches to chlordane was determined by continuous exposure on residues in pint jars (method described by Keller **et al.** 1956a). If only a few male roaches were obtained, females were sometimes collected and kept in the laboratory and their male progeny were tested. The knockdown and kill at regular intrevals and time required to kill 50% (LT-50) or 90% (LT-90) for each collection are recorded in table 1, page 10.

The LT-50's ranged from 3.2 to 126.0 hours; 6 collections had LT-50's less than the normal laboratory strain (4.1 hours) and 22, greater. On the arbitrary assumption that any group of roaches with an LT-50 or LT-90 three times as great as normal is significantly resistant, 12 collections, or 43%, were moderately to highly resistant.

It is interesting to note that nonresistant and highly resistant roaches were collected from two dwellings that were within the same block (collections 4 and 28, 11 and 23).

Of two collections (2 and 25) made at one apartment, one before treatment with chlordane and one eight weeks after treatment, the original collection was nonresistant and the second highly resistant. Either reinfestation with resistant roaches occurred, or a small number of resistant roaches were present but not picked up with the original sampling.

Tests in Homes

The following insecticides were tested against natural infestations of German roaches in homes: malathion, Chlorthion, Dipterex, Dow ET-14, Dow ET-15; and chlordane as 2% oil sprays, Diazinon as a 0.5% oil spray and sodium fluoride and ryania (powdered stem of ryania 95.8% **n**-propyl isome 3.2%; inert ingredients 1%) in dusts.

Sprays were applied with a 2-gallon pressure sprayer equipped with a fan-type nozzle, and the dusts with a small plunger-type duster. Both sprays and dusts were applied as spot treatments to areas where roaches were hiding or would be most likely to walk. Sprays were applied to the point of runoff.

The homes were inspected before treatment, and the number of roaches present was estimated just before application. Each home was inspected for dead and live roaches during the first two days after treatment, then twice a week until the seventh week and once a week thereafter until the test was terminated. If no dead or live roaches were found over a two- to three-week period, light applications of pyrethrum aerosol were used to drive out any hidden ones. Insecticides were evaluated on the basis of

1. A continuation of investigations formerly supported by funds allotted by the Department of the Army.

TABLE ONE

Susceptibility to chlordane residues of German roaches collected in various homes.
(Continuous exposure to 10 mg. of chlordane per square foot in pint jars.)

Collection	Number of roaches	Percent knockdown and kill after hours indicated														LT-50 (hours)	LT-90 (hours)
		2	3	4	5	6	7	8	12	24	48	72	96	120	144		
1	10	0	40	100	—	—	—	—	—	—	—	—	—	—	—	3.2	3.9
2	20	0	40	80	100	—	—	—	—	—	—	—	—	—	—	3.2	4.5
3	10	0	0	90	100	—	—	—	—	—	—	—	—	—	—	3.3	4.3
4	10	0	10	70	100	—	—	—	—	—	—	—	—	—	—	3.7	4.5
5	17	12	18	41	77	88	100	—	—	—	—	—	—	—	—	3.7	5.7
6	10	0	10	60	100	—	—	—	—	—	—	—	—	—	—	3.9	4.9
Laboratory colony	80	3	15	31	60	97	100	—	—	—	—	—	—	—	—	4.1	5.9
7	18	0	6	33	77	100	—	—	—	—	—	—	—	—	—	4.4	5.7
8	10	0	0	0	30	100	—	—	—	—	—	—	—	—	—	4.4	4.7
9	5	0	0	0	60	80	100	—	—	—	—	—	—	—	—	4.7	6.5
10	10	0	10	20	60	80	100	—	—	—	—	—	—	—	—	4.7	6.8
11	10	0	10	30	60	80	90	100	—	—	—	—	—	—	—	4.7	7.0
12	10	0	0	10	50	90	100	—	—	—	—	—	—	—	—	4.9	6.0
13	11	0	0	9	27	64	91	100	—	—	—	—	—	—	—	5.4	6.9
14	10	0	10	10	10	—	80	90	100	—	—	—	—	—	—	5.8	8.5
15	13	8	23	38	38	38	46	53	—	92	100	—	—	—	—	6.6	22.0
16	3	0	0	0	33	33	67	67	67	100	—	—	—	—	—	7.0	13.0
17	3	0	0	0	0	33	33	33	33	100	—	—	—	—	—	9.5	14.3
18	13	0	0	15	15	15	15	38	—	92	100	—	—	—	—	9.9	21.0
19	7	17	29	29	29	29	29	29	—	54	100	—	—	—	—	10.0	40.0
20	10	0	0	10	30	30	30	—	—	60	90	90	90	90	90	15.5	80.0
21	6	0	0	0	0	0	0	0	—	66	100	—	—	—	—	21.0	31.0
22	24	0	0	0	0	4	21	—	—	83	88	88	88	93	93[a]	25.0	72.0
23	7	0	0	0	14	14	14	14	29	71	71	71	100	—	—	28.0	100.0
24	10	0	0	0	0	0	0	0	—	20	30	70	95	95	—	52.0	88.0
25	3	0	0	0	0	0	0	0	0	67	67	67	67	67	67[a]	72.0	150.0
26	3	0	0	0	0	0	0	0	—	0	0	0	100	—	—	83.0	88.0
27	9	0	0	0	0	0	0	—	—	10	20	20	30	78	100	85.0	148.0
28	10	0	0	0	0	0	0	0	—	0	0	0	0	40	80[b]	126.0	190.0

a 100% mortality after 192 hours.

b 90% mortality after 192 hours.

TABLE TWO

Results of tests with various insecticides for the control of German roaches in homes.

Insecticide and Concentration	Number of homes treated	Pretreatment count (average)	Percent reduction in live roaches after indicated days																
			1	2	5-6	8-9	12-13	15-16	19-20	22-23	26-27	29-30	33-34	36-37	40-41	44	47-48	54-55	61-62
Oil sprays:																			
Diazinon 0.5%	6	72	94	94	98	99	99	99	99	99	99	98[a]	98	99	99	93	93	—	—
Malathion 2.0%	8	51	97	99	98	99	98	98	99	98	98	97	99	99	97	—	97	97[a]	—
Chlorthion 2.0%	6	68	98	99	96	99	99	98	99	98	95	99	99	99[a]	99	—	91	91	39
Dipterex 2.0%	6	88	85	95	95	97	98	99	92	94	92	92	96	95	95[a]	—	94	88	—
Dow ET-14 2.0%	5	44	72	91	91	99	99	96	98	99[a]	97	97	99	98	97	—	96	98	97
Dow ET-15 2.0%	5	51	98	98	99	94	96	95	99[a]	99	100	100	97	93	93	—	—	—	—
Chlordane 2.0%																			
Resistant roaches	4	52	84	91	88	91	87	88	87	93	84	85	61	52	55	—	—	—	—
Nonresistant roaches	3	50	90	97	97	99	100	99	100[a]	100	100	100	100	96	95	—	—	—	—
Dusts:																			
Sodium fluoride	4	63	42	54	50	45	51	62	61	—	—	—	—	—	—	—	—	—	—
Ryania	5	37	15	22	33	38	34	41	0	—	—	—	—	—	—	—	—	—	—

a Last inspection when 2 or more dead roaches were found.

the percent reduction in the number of live roaches after treatment. Results are given in table 2 above.

A high degree of control (90 to 100%) was attained with all oil sprays. From 1 to 12 days elapsed before the maximum control with the various spray treatments was noted; after five to seven weeks, the control began to decrease. Against nonresistant roaches chlordane was the most effective insecticide, giving 99 to 100% control from the 8th to the 36th day. Against slightly to highly resistant roaches, it gave 84 to 93% reduction for 30 days. The various phosphorus insecticides gave 98 to 100% control the following number of inspection days during the nine-week test period: Diazinon and Chlorthion 11; malathion 10; Dow ET-14 and ET-15 7; and Dipterex 2.

More Thorough the Treatment, Better the Chance to Kill

Sodium fluoride dust gave a maximum reduction of 62% in the number of live roaches seen compared with 41% for ryania.

These home tests indicate oil sprays of any of the phosphorus insecticides tested will give good control provided they are applied thoroughly. This means treatment of all areas where roaches would be likely to hide or contact the residues, as well as the places where they are found at the time of application. The more thorough the treatment, the better the chance that roaches will remain on a treated surface long enough to be killed.

During the course of home tests, it became apparent completeness of initial kill and time required for reinfestation were

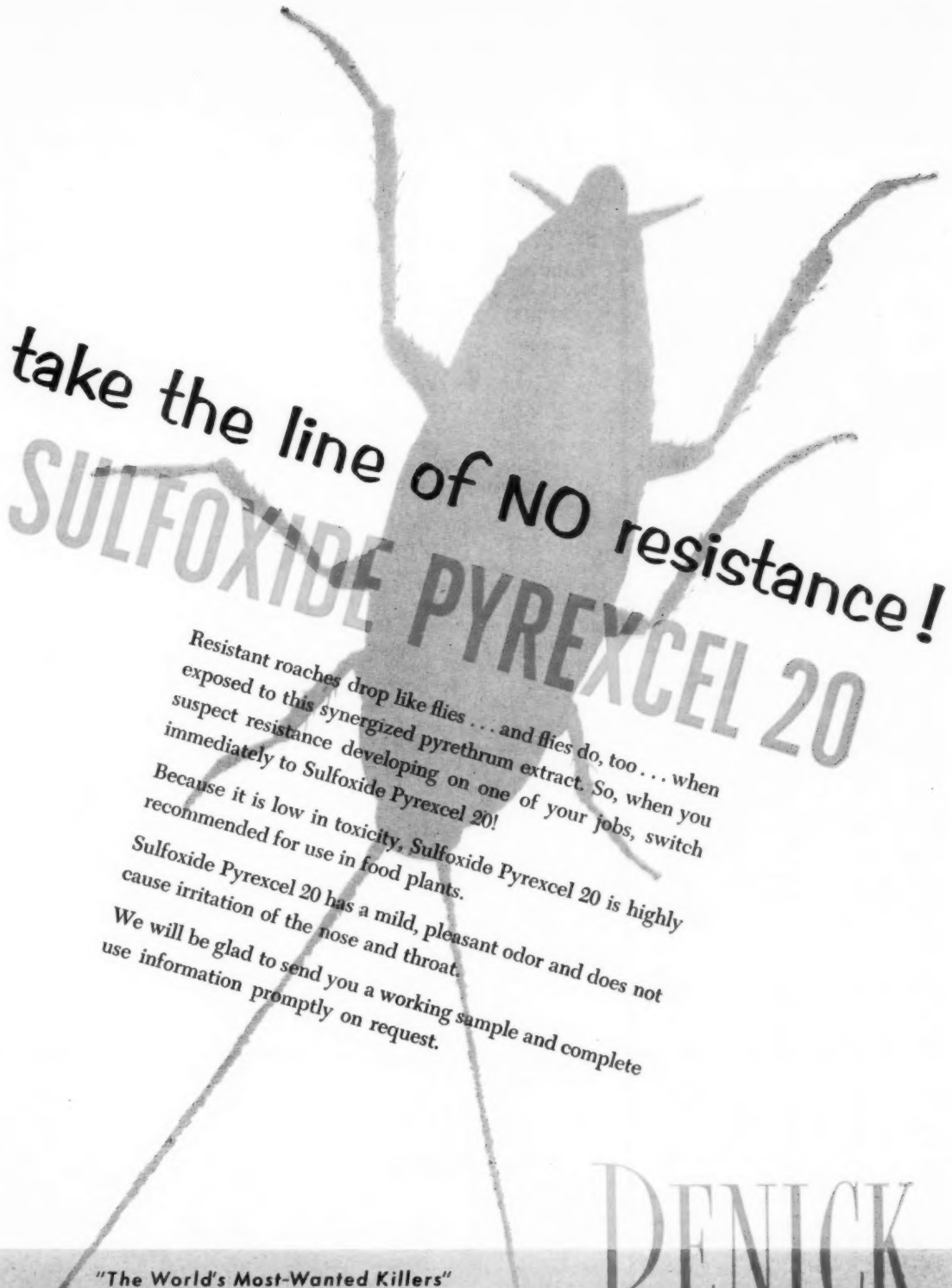

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TABLE THREE

Hours of exposure required to obtain 100% kill of German roaches exposed on plywood panels treated with oil sprays and aged in homes for various periods. (Panels tested in the laboratory; duplicate tests with 5 male roaches each.)

Insecticide and Concentration	Number of panels	1 week		2 weeks		4 weeks		8 weeks	
		Range	Average	Range	Average	Range	Average	Range	Average
Chlordane 2%	7	0.5-1	0.7	0.5-4	2.4	1-16	5.0	4-96	59.0
Chlorthion 2%	6	1-2	1.7	1-2	1.7	0.5-4	2.4	4->8	>6.0
Dow ET-15 2%	5	1-2	1.8	2	2.0	2-8	4.0	1-16	9.0
Dipterex 2%	5	.5-4	3.3	4-8	6.4	4-72	23	8-72	32
Dow ET-14 2%	8	2-8	3.8	2->24	>8.3	8-144	53	48-312	152
Diazinon 0.5%	6	4-8	6.6	8-112	31	16-142	66	144->360	>324
Malathion 2%	6	>4->16	>10	16-24	20	16-240	75	—	—

important factors in connection with the duration of residual action. Once roaches were almost or completely eliminated from a home, from two to more than six months were required before the infestation built up appreciably or heavy reinfestation occurred. This long period could have been due to the residual action of the insecticide, to the comparatively long life cycle of the German roach (six to ten weeks), to the absence of a reinfestation source, to the greater susceptibility of young roaches (first or second instar) to the residues or to a combination of any of these factors. From this, it is evident any insecticide giving a high initial kill may appear to give long residual control even though it has lost its effectiveness after one or two weeks.

Frequency of Service Required

Another set of tests was conducted to determine the frequency of treatments necessary to maintain complete control of German roaches in homes. Oil sprays containing 0.5% Diazinon or 2% chlordane or malathion were used. Chlordane was applied only in homes with nonresistant roaches. The homes were checked every two weeks and re-treated if one or more live roaches were found. As in previous tests, light applications of pyrethrum aerosol were used, if necessary. The tests were terminated after six months.

Of four homes treated with Diazinon, one was completely free of roaches during the 26-week period; the second required re-treatment after 12 weeks, a third after 20 weeks and the fourth after 2 and 12 weeks. Three chlordane-treated homes needed a second treatment after four or six weeks. One of these needed a third application after 14 weeks. Malathion eliminated all roaches in one home with a single treatment, but three applications over the first six weeks were necessary in three other homes.

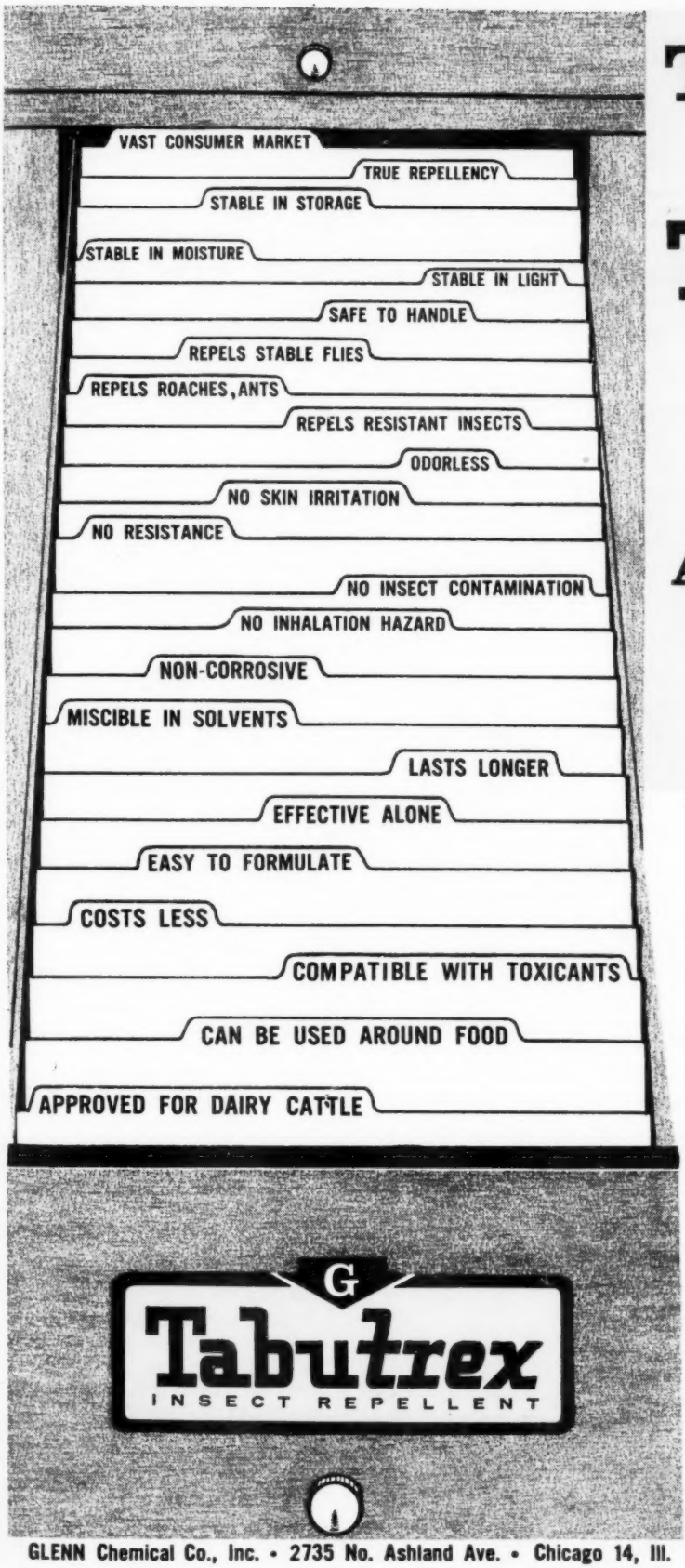
Aging Tests

In conjunction with the previous tests, experiments were conducted to compare the residual persistence of malathion, Diazinon, Chlorthion, Dipterex, Dow ET-14, Dow ET-15 and chlordane.

At the time each insecticide was sprayed in a home, an unpainted plywood panel 1 foot square was sprayed to the point of runoff and left in an out-of-the-way part of the kitchen. The panels were taken to the laboratory after one, two, four, and eight weeks, and the exposure time required to cause 100% mortality of duplicate sets of five male roaches on each panel was determined. The roaches were confined on the panels under plastic dishes dusted inside with pyrophyllite to prevent them from leaving the treated surface. After exposure for ½ to 24 hours, the roaches were removed to clean Petri dishes, and the mortality after 48 hours was recorded. If complete kill was not attained with a 24-hour exposure, roaches were confined on the panels continuously, and knockdown and mortality, noted every 24 hours. Water and dog food were provided if the exposure period exceeded 48 hours.

Results of these tests are given in table 3. After aging one week, chlordane was the most effective material. Chlorthion and Dow ET-15 were at least equal to chlordane after two and four weeks, and considerably superior to it after eight weeks. Diazinon and malathion, which reduced nonresistant roach populations in homes as much as chlordane, appeared to be least durable of the

(Continued on page 47)



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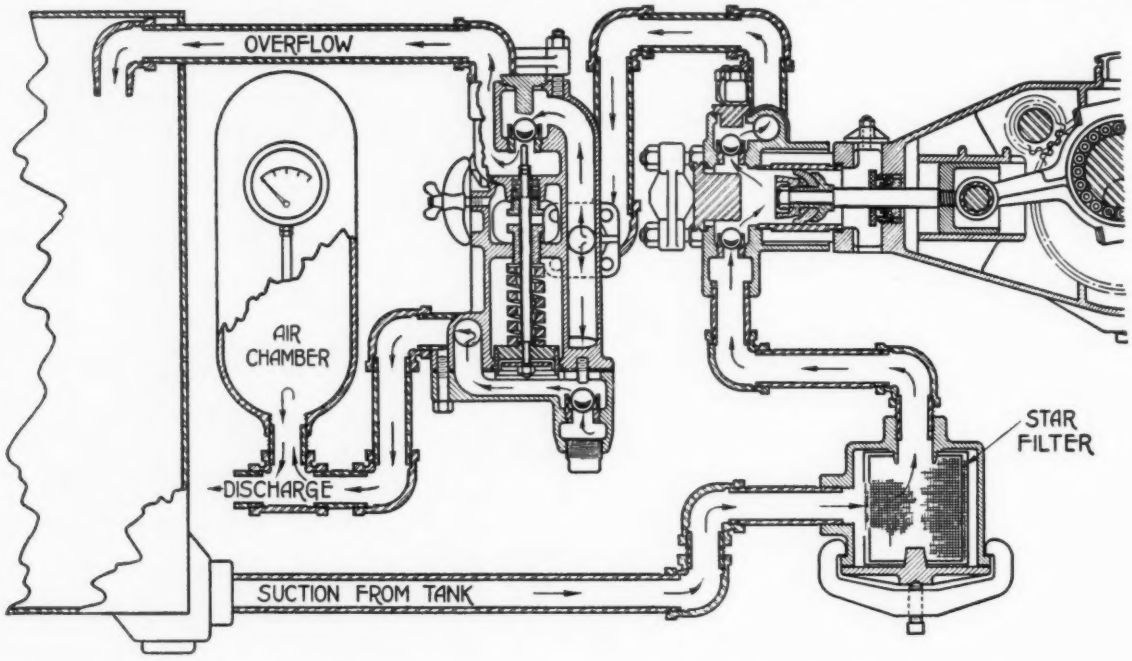

By **PAUL F. YOUNG,** John Bean Division, Food Machinery Corp., Lansing, Michigan

MOST COMMON sprayer problems do not involve mechanical failures, but rather a decrease of pressure. The cause of most mechanical sprayer problems can be determined without using a wrench. This applies to all piston type, both horizontal and upright, orchard, field and commercial sprayers.

In the flow-pattern of most sprayers, liquid leaves the tank, passes through the suction line, filter, intake valves, cylinders, outlet valves and into the regulator. From the regulator, it goes out the discharge line to the nozzles or back through the overflow to the tank, as indicated in the accompanying diagram.

Pressure Regulator

The main purpose of a regulator is to control the maximum pressure by subjecting spray liquid to a set spring tension.

When nozzles are closed, pressure compresses the spring, which automatically opens the overflow valve and closes the check valve. This permits total pump volume to pass at no pressure through the overflow and back into tank, thus allowing pump and engine to run without "load."

After the regulator's spring tension has been set, using an accurate gauge, it should never be changed unless a different operating pressure is desired. This set spring tension has no influence on pressure losses.

Diagnosing Pressure Losses

The overflow is the key to positive diagnosis of pressure losses. When a sprayer is operating perfectly, with discharge nozzles—or gun—closed, the operator can easily get a "visual" estimate of the volume coming through overflow, back into the tank.

When pressure losses occur, look at the overflow. Is the amount of liquid flowing from the overflow normal, below normal, steady or irregular? Keeping an eye on the overflow, turn gun or nozzles on and see what happens. Does overflow stop or continue at reduced volume? By recognizing these symptoms, you can easily locate the source of your problem and correct it. Here are a few typical examples:

Gradual Decrease of Pressure Over a Period of Use

Example 1. Overflow is normal. Turn on nozzles. Overflow stops.

Cause: Disc is too large in discharge nozzle.

To correct: Install proper size disc in discharge nozzle or nozzles.

With a normal overflow there can be no other cause. The important point is that this common and simple trouble can be accurately determined without looking at the disc or any other part of the sprayer except the overflow.

Example 2. Identical problem: decreases of pressure over a period of use. Overflow is normal at first, but when you turn on nozzles, overflow continues at reduced volume.

Cause: Overflow valve in the top of the regulator is leaking.

To correct: Stop leak and replace seat; also the ball, if worn or pitted. Check the distance be-

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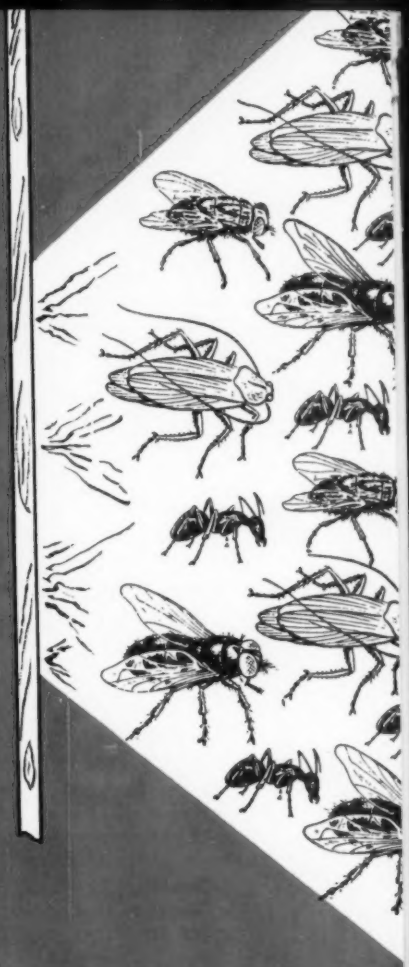

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tween ball and stem. (See your sprayer instruction book.)

Example 3. The problem is the same: a decrease of pressure over a period of use. Overflow is below normal, and when you turn on nozzles, overflow stops.

Cause: Obstruction in suction line, or pump is operating too slowly.

To correct: Remove filter screen. If filter is clogged, clean it. If filter is clean, look for obstruction in suction line, such as a piece of paper from a spray material bag, etc. If the suction line is free of obstructions, check the pump speed.

Sudden Total Loss of Pressure

Example 1. No overflow.

Cause: Cutoff in suction line is closed, petcock in siphon suction line is open, or end of suction line is above the level of spray liquid in the tank.

To correct: Make sure the suction line cut-off is open, close petcock in siphon suction line, and submerge the end of suction hose in spray liquid.

Example 2. No overflow, except a hissing fog or an occasional small spurt.

Cause: Air lock.

To correct: Leave nozzles open and operate the pump until the flow of liquid is normal.

Irregular Loss of Pressure

Example 1. Overflow is below normal, not steady, and is accompanied by a hissing sound.

Cause: Small air leak in suction line.

To correct: Stop leak by tightening connections, or replace the leaking unit.

Example 2. Overflow is below normal and not steady.

Cause: Probably some obstruction holding a valve ball in the pump or pressure regulator off the valve seats.

To correct: Remove obstruction and make certain valve ball "seats" evenly.

If spray material starts leaking around the pump cylinders, it is an indication that the plunger packing, or suction cups as they are sometimes called, need to be replaced.

Sudden Abnormally Loud Noise

Example 1. Regulator stem is vibrating or chattering.

Cause: Packing around regulator stem is too loose or there is an improper adjustment.

To correct: Snug the regulator stem packing nut, or adjust height of stem (see your sprayer instruction book.) Do not run sprayer with the regulator stem chattering.

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Lubrication

Follow recommendations outlined in your sprayer instruction book, using correct types of lubricating oils or greases. Change oil in pump case at recommended intervals.

General Care of Your Sprayer

Just normal "good housekeeping" practices will insure long, trouble-free service from your sprayer.

1. Use reasonably clean water in your sprayer tank.

2. Always flush tank, pump and discharge equipment thoroughly after you have finished spraying for the day.

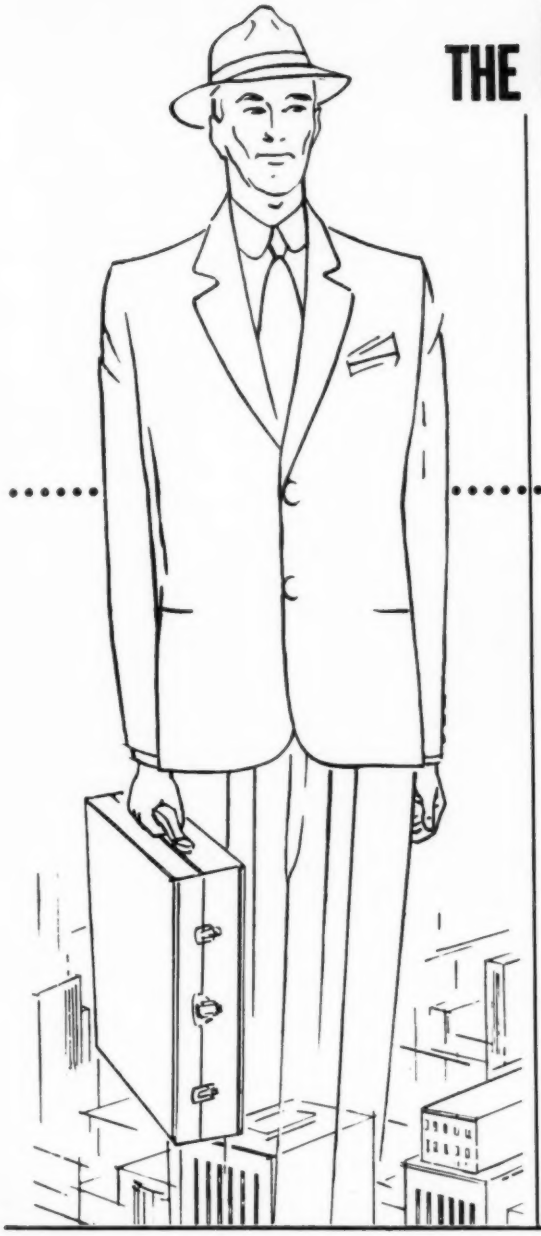
3. Always **fill** the tank with water when the sprayer is not in use and temperatures are above freezing. This gives an excellent means of emergency fire protection. It will keep spray chemicals from drying and caking on the inside surfaces of the tank. This will also keep the oxygen from the metal and prohibit rusting of the inside of metal tanks not treated with the new protective coatings furnished on some new sprayers.

4. To assure good thorough mixing of chemicals in the spray tank, it is recommended the tank be half full of water before any chemicals are dumped into it.

5. It is recommended the sprayer engine and pump be kept running at all times while powdered chemicals are in the tank. This will keep the chemicals in solution, or suspension, in the water and avoid possible clogging of the suction line strainer. If for any reason the sprayer is allowed to set with chemicals in the tank and the pump not in operation, be sure to run it for a couple minutes and make certain the materials are thoroughly agitated and mixed in the water before starting to spray again.

6. For the protection and health of the operator, follow **carefully** the precautions listed by chemical manufacturers on their containers.

These simple suggestions should help sprayer operators; but if more serious problems arise, your sprayer dealer or the manufacturer will be glad to help you. Your sprayer is engineered and built to give you many years of satisfactory service. Good care and regular servicing will pay dividends in terms of reduced operating costs.



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CURRENT USE OF

Thermal Conductivity Gas Analyzers

FOR THE MEASUREMENT OF FUMIGANTS

by

G. L. PHILLIPS

Stored-Grain Insects Laboratory[1]
Manhattan, Kansas

SUMMARY

Improvements developed in thermal conductivity gas analyzers since they were first adapted to measuring fumigants in 1952, instructions on the operation and calibration of units, supplemental equipment to use with the units, and the utilization of units by the U. S. Department of Agriculture are presented in this elaboration of Bureau of Entomology and Plant Quarantine Publication E-851.

THE THERMAL conductivity method of measuring concentrations of methyl bromide in air was first adapted in the U. S. Department of Agriculture in 1952 (1) for use as a supplement to the chemical analysis method which had been in use for many years. Since that time, production models of the original manufacturer have been improved somewhat, and a number of units have been in extensive use. This paper is intended to augment Bureau of Entomology and Plant Quarantine Publication E-851, and to bring up to date information on the most effective operation of the units used[2], based on the extensive experience under field and laboratory conditions since 1952.

Gas analysis by measuring the property of thermal conductivity is not new. Andrews (2) observed that a wire enclosed in an air-filled tube and heated to incandescence would lose most of its glow on the admission of hydrogen. Many scientists in the 19th century noted this phenomenon and discussed it in papers presented to the Royal Society and others. A complete history of this subject will be found in writings of Daynes (3), Minter and Burdy (4), and of Palmer and Weaver (5).

Measurement of thermal conductivity by the hot wire method of gas analysis is a quick way to determine gas concentrations. The instrument works on a principle similar to that of the resistance thermometer. A suitable filament is heated by passing a known constant electrical current through it. If there is a constant current and a constant ambient temperature, the filament temperature is a function of the thermal conductivity of the surrounding gas. When a new gas component is added which alters the thermal conductivity of the original mixture, the temperature of the filament is also altered, and thus its electrical resistance is changed. This alteration in electrical resistance can be measured.

These changes are measured by a Wheatstone bridge circuit. Four lengths of wire having a relatively high temperature coefficient of resistance, such as tungsten, are housed in separate cavities in a single cell block. Two of the wires are surrounded by air, and form one side of a Wheatstone bridge, known as the reference side. The other two wires are exposed to the gas to be measured, and form the unknown or analysis side of the bridge (figs. 1 and 2, page 20).

The difference in resistance between the reference side of the bridge and the unknown or analysis side is indicated by the deflection of a galvanometer across the bridge. By varying the shunt resistance of the galvanometer, deflections on the galvanometer scale can be made to read directly in ounces of fumigant per 1,000 cubic feet.

Of the various physical characteristics of gases which offer possibilities for the development of portable instruments to determine concentrations of gases, thermal conductivity is considered to be one of the more sensitive and reliable.

Improvement of Units

The original unit described in Bureau of Entomology and Plant Quarantine Publication E-851 was a single-pass[3] model, the cell block having 4 filaments, with the reference cells filled with dry air. The bridge current was supplied by 6-volt dry cell batteries.

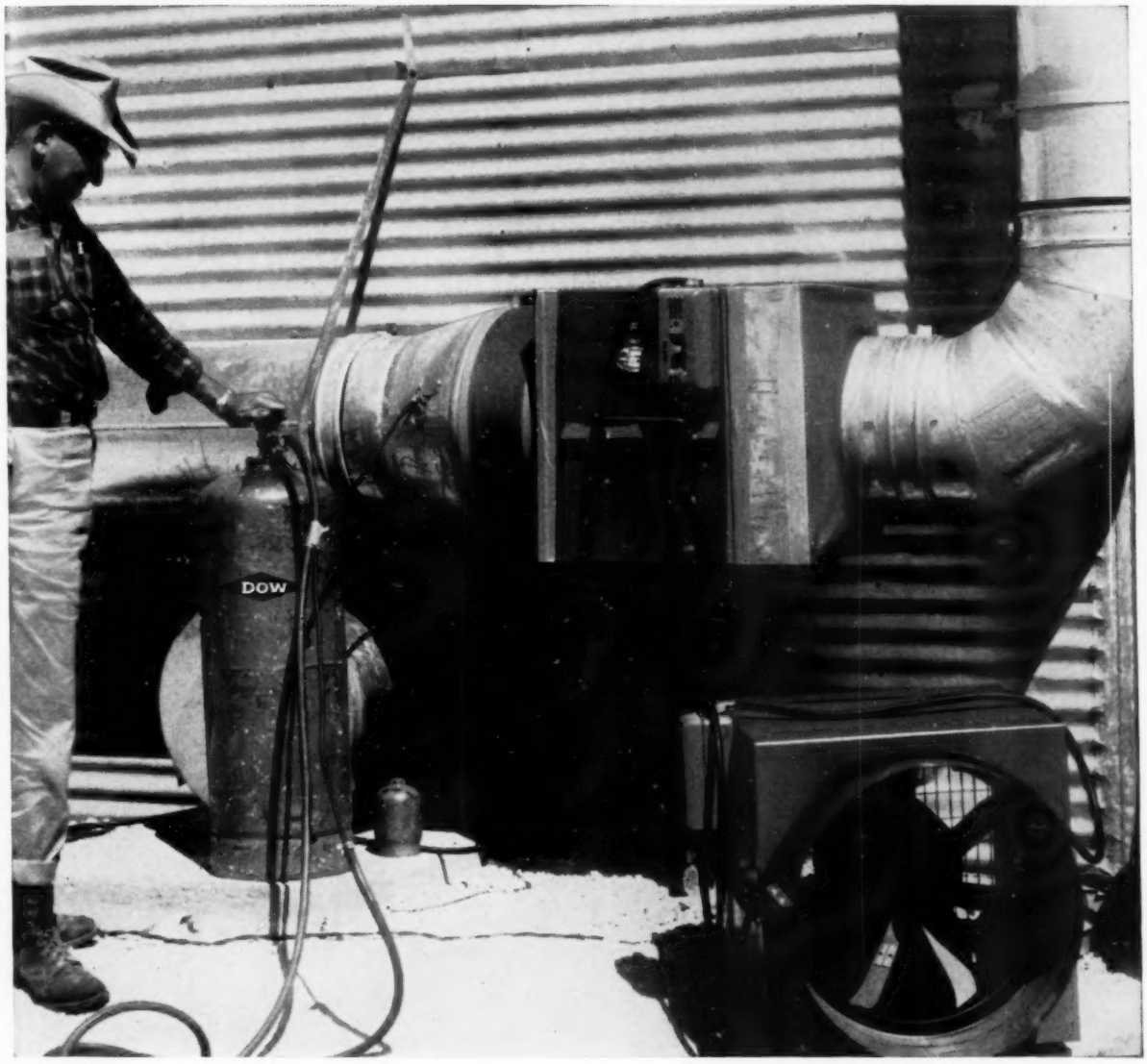
A second unit, typical of many now in use by pest control operators and industry technicians, was of the same type, but in addition had an auxiliary unit containing the power supply. This unit, to convert 110 v., 60 cycle, alternating current to direct current for use in the analyzer unit, contained a voltage stabilizer with a stability of + 0.5%, a voltage stepdown transformer, a full wave bridge selenium rectifier, and an electrolytic filter condenser. The pump which drew the gas sample through the analyzer, and the flowmeter, were also in the auxiliary unit.

The third and fourth units were double-pass[3] models, one with 4 filaments, and one with 8. The 8-filament unit required 12 volts d. c. instead of 6 volts

1. This laboratory is one of the field stations of the Stored-Product Insects Section, Biological Sciences Branch, Marketing Research Division, Agricultural Marketing Service, U. S. Department of Agriculture.

2. Manufactured by the Gow-Mac Instrument Company, 100 Kings Road, Madison, N. J. Recently a second manufacturer, Robt. K. Hassler Co., P. O. Box 177, Altadena, Calif., has placed two models on the market, one quite similar to those discussed in this paper, and one a "junior" portable model. It is believed that much of the discussion herein will apply to the standard of these two models, but no actual study was made of it. There are other thermal conductivity gas measurement instruments manufactured by other companies, but as far as known, none of these has been adapted to the measurement of fumigants.

3. In so-called single-pass units, the cavities on the reference side are permanently sealed and contain dry air, and the gas to be analyzed is passed through the cavities on the analysis side. In double-pass units, the gas may be passed through either pair of cavities. An air sample from the commodity or from the outside is sealed in the pair selected as the reference side. By alternating the pair used for the analysis side, the corrosion of the filaments is equalized and the life of the cell block lengthened. In addition the use of an air sample from the commodity equalizes the influence of moisture since relatively the same percentage will be present in the reference and analysis sides, and often a desiccator trap can be eliminated and the readings speeded up. The double-pass unit may also permit the use of a gas reference which will give a greater difference with certain fumigants than air will give.



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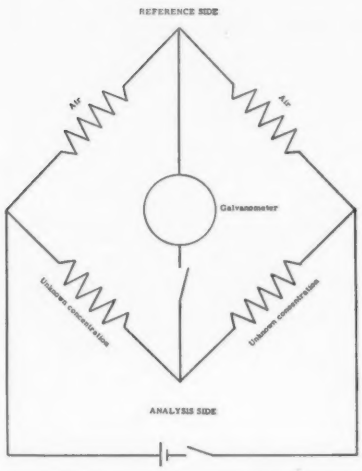


Figure 1. Diagram of a Wheatstone bridge arrangement to determine gas concentrations by thermal conductivity.

and provided a greater degree of sensitivity. Each of these units later had a galvanometer variable shunt resistance added which consisted of a 100-ohm, 10-turn, precision slide wire potentiometer with microdial settings. This is often called a span adjuster. These span adjusters made it possible to measure a wide range of concentrations, and to read the meter in ounces of fumigant per 1,000 cubic feet. The adjuster could be set to predetermined calibrations for 1, 2, 4, etc. ounces per 1,000 cubic feet, and obviated the need for a conversion chart as was necessary with earlier models.

Additional units have been similar to the third and fourth ones. Units have been observed that were equipped with automatic electronic recording devices in order to have a chart record of the gas concentrations.

The basic principle in gas analysis by thermal conductivity is that the two gas mixtures which are being compared (reference vs. sample) are alike in all respects except in the single component (i.e., methyl bromide) which is being measured. The presence of water, vapor, a variable carbon dioxide content, or impurities in the air are examples of factors which may affect the reading. It has been found advisable to equip all single-pass units, which have dry air references, with a moisture trap in the sampling line to remove moisture before the sample reaches the analyzer. Common commercial desiccants have worked successfully, but slow down the time required to obtain readings. Corrosive materials such as calcium chloride have been carefully avoided. The same type of trap was found necessary with the double-pass units if excessive moisture was present.

In some instances, inability to balance the instrument was found to be due to the presence of CO_2 in the commodity. A trap in the sampling line filled with an appropriate absorbent successfully removed this disturbing element. These chemicals were changed when their color indicators showed that their sorptive capacity was nearing exhaustion.

Pilot lights were placed on auxiliary units to indicate when the current was on, and fuses were inserted in the circuits for protection.

When the flowmeter and the pump were placed in the analyzing unit, the unit could be operated without an auxiliary unit if battery power was used. Special provision was then made to operate the pump in such instances.

From experiences in using the gas analyzers, it is believed that the most useful arrangement would be as follows:

Analysis unit

1. Double-pass, 4- or 8-filament cell block.

2. Galvanometer.

3. Precision slidewire (span adjuster).

4. Current control rheostat.

5. Zero balance rheostat.

6. Double throw switch to convert galvanometer to an ammeter.

7. Double throw switch to reverse the polarity of the current.

8. Two terminals for use with a recorder unit, or for an additional meter to check the unit or increase its sensitivity, and a double-pole double throw switch to direct the output to these terminals.

9. Single-pole double throw switch with two terminals to provide for an internal source of power (batteries) or an external source (the auxiliary unit).

10. Flowmeter.

11. Pump.

Auxiliary unit

1. Voltage stabilizer.

2. Voltage stepdown transformer to change 110 v., a.c., to 6 or 12 v., d.c., as required by the accompanying analyzer unit.

3. Powerstat variable voltage transformer (optional).

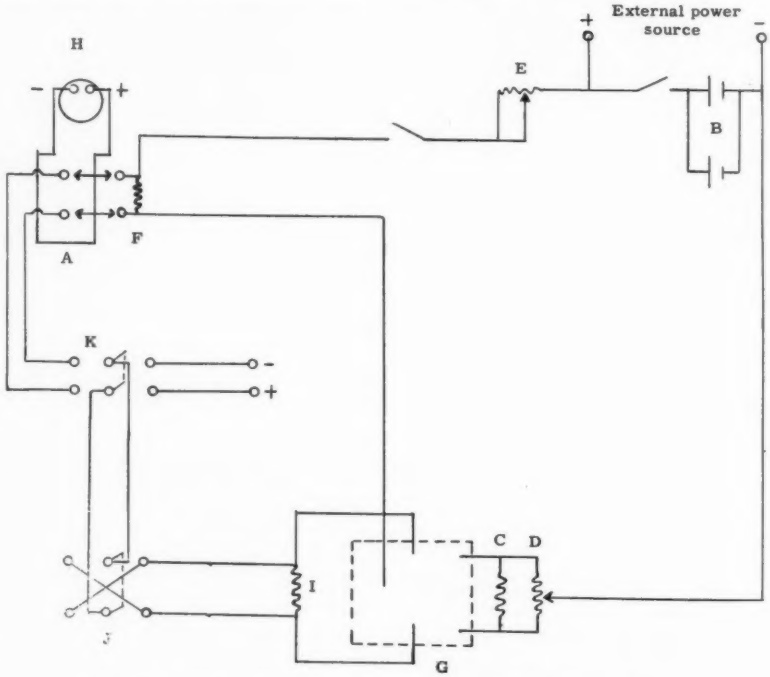
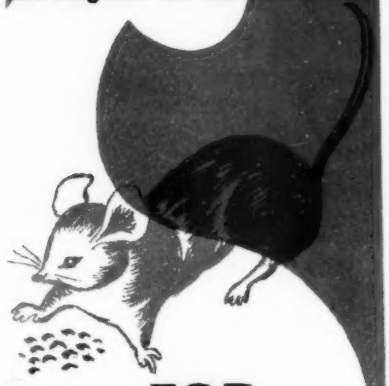


Figure 2. Wiring diagram of the thermal conductivity gas analyzer units.

(Courtesy of the Gow-Mac Instrument Company).

(A) Switch to convert galvanometer to an ammeter
(B) 6 V battery
(C) 0.5 ohm rheostat
(D) 2 ohm rheostat
(E) Current control 20 ohm rheostat
(F) 138 MA shunt
(G) MTT - TC cell
(H) 5 MV, 16 ohm galvanometer
(I) 100 ohm span adjuster
(J) Normal-reverse switch to reverse polarity of galvanometer.
(K) Switch for "indicate" or "record"

P·C·O·'s Pick PIVAL®
Anti-Coagulant Rat and Mouse Killer



FOR DRY BAITING

It doesn't take long for a good thing to get around. That's why, PIVAL is now the choice of leading P.C.O.'s across the country. Why? Because PIVAL *works*—it's an effective killer; and it's easy to use—saves you time and effort.

PIVAL is tops in acceptability! Tests with other anti-coagulants show PIVAL has substantially greater acceptability, offering more effective control.

PIVAL resists insects! PIVAL baits are less subject to insect infestation even under severe conditions which means baits remain uncontaminated longer.

PIVAL resists mold! Even under tough conditions, PIVAL baits remain mold-free and attractive to rats longer.

Join the leading P.C.O.'s who pick PIVAL for dry baiting. Now time-tested, it's been proven tops for controlling Norway rats, roof rats and house mice. Order now.

MOTOMCO, INC.
Terminal Ave., Clark, N. J.

4. Full wave bridge selenium rectifier.
5. Electrolytic filter condenser.
6. Pilot light.
7. Fuse.

Operation of Units

Instructions for operation accompany each unit when purchased. The following instructions are intended to aid the inexperienced operator and supplement the manufacturer's instructions:

1. Do not connect the instrument the first time until manufacturer's instructions have been thoroughly studied.

2. Connect to power supply.

3. Adjust the current control rheostat until the ammeter reads the specified milliamperes. If this current flow is exceeded, injury to filaments may result. The proper adjustment should cause the needle of the meter to deflect to a full scale reading.

4. Allow filaments to heat up for about 10 minutes. This will keep the unit in balance for a longer time.

5. Purge flow systems of single pass units by passing air through a moisture trap until there is no further deflection of the meter needle, then adjust the needle to zero. Flip the polarity toggle switch (labeled "normal-reverse" on some instruments) back and forth several times to check adjustment. To balance double pass units, pass air through both sides for one or two minutes by removing caps on reference cavities and connecting the exhaust tube of the analyzing side to the reference cells. Turn off pump, disconnect exhaust tube, and replace caps on reference pass. Adjust meter needle to zero. It is usually not necessary to use a moisture trap. To determine this, draw air from a sampling line in the commodity and pass through the analysis cells . If the instrument balances at zero, it is safe to assume there is no moisture problem. If it does not balance, a moisture trap should be inserted and dry air placed in the reference side. If it still fails to balance, a CO_2 trap should also be tried.

6. Connect analyzer unit to selected gas sampling line.

7. Set flowmeter at 1 c.f.h. (cubic foot per hour) which is 472 cc./min.

8. Purge the sampling line before taking a reading.

9. Connect one sampling line right after another, but allow a few minutes before each reading for the meter to reach the maximum point.

10. About every 10 readings, flip the power switch to see if the meter needle returns to a full scale reading. If not, purge the cells with fresh air. If the needle still fails to return to a full scale reading, adjust the current control rheostat until the meter gives a full scale reading (see item **3**), or if the unit is battery operated, check the batteries. Then recheck the zero balance (see item **5**).

Calibration of Unit

It is necessary to calibrate each new instrument for each of the

P·C·O·'s Pick PIVALYN®
Anti-Coagulant Rat and Mouse Killer

FOR WET BAITING

Leading P.C.O.'s have found water baiting is more effective with PIVALYN. It's the only water soluble anti-coagulant which combines top acceptability and resistance to mold. With its exclusive properties, PIVALYN has proven to P.C.O.'s that water baiting affords highly successful control.

Another reason P.C.O.'s pick PIVALYN is its ease of use. It's packaged as a 1.5% concentrate in convenient individual foil packets. One PIVALYN packet to one quart of water—that's all there is to it! As a "taste-treat" for rodents, and under conditions of difficult control, sugar may be added to the PIVALYN solutions.

And you needn't worry about mold! PIVALYN water baits normally remain mold-free for periods up to eleven weeks.

So, join the leading P.C.O.'s who pick PIVALYN for water baiting. A worthy companion to PIVAL, it, too, is tops in its field. Order a box of 100 packets now.

MOTOMCO, INC.
Terminal Ave., Clark, N. J.

gases to be measured, and it is advisable to recalibrate each one at periodic intervals, since use experience has shown that the instruments will not stay calibrated indefinitely.

A unit may be calibrated by comparison with chemical analysis of the same concentrations, or by comparison with another instrument already calibrated. A calibration for methyl bromide can be checked by comparing readings with those obtained from water-pumped nitrogen. A working calibration can be made where no chemical analysis method is available, by analyzing measured amounts in a small fumigation chamber. These processes are described as follows:

Chemical analysis method

1. The fumigant is vaporized into the chamber, which has a means of agitating the fumigant gas so as to have a uniform concentration. A 55-gallon drum is excellent for this purpose. The tube from the exhaust side of the unit is connected to the chamber so that a closed circuit is maintained during the calibration process.

2. Alternate samples are analyzed by a standard chemical method and by the unit, until the unit, after adjustment, agrees with the chemical results in repeated samplings. The unit is purged with fresh air between readings and checked to see if it will zero out.

3. The span adjuster is set so that each division on the galvanometer scale equals 1 ounce per 1,000 cubic feet, if the expected dosage range in practice will run less than 100 ounces per 1,000 cubic feet. When desired, settings are determined so that each scale division equals 2 or 4 ounces.

The turn indicator of the span adjuster is set at 10 in starting, which introduces maximum shunt resistance into the circuit. The indicator is then turned counterclockwise until the meter needle reads in 1, 2, or 4 ounces per division as desired, based on the chemical results. The dial settings of the span adjuster for these readings are recorded and attached to the instrument.

Comparison with calibrated unit

The uncalibrated and calibrated units are connected to the same fumigant source and simultaneous readings are made. The span adjuster of the uncalibrated unit is changed until the meter reading agrees with the calibrated unit. This reading is then recorded and attached to the instrument. A single sampling line to the test chamber is fitted with a Y-tube, and one unit attached to each side of the Y. Repeated samplings are taken and both units purged with fresh air between readings. The comparisons are most reliable if made at more than one concentration level.

Nitrogen check of calibration

A calibrated unit is checked to determine whether it is still reasonably accurate for methyl bromide, by the use of water-pumped nitrogen. The container of nitrogen is attached to the unit by a short length of tubing and the vapor drawn through the analysis side at the rate of 1 c.f.h. If the unit is in adjustment, and both the unit and the nitrogen cylinder are between 70° and 75° F., the reading on the galvanometer scale is 38, if the span adjuster is set to read directly in 1 ounce of methyl bromide per scale division. If the temperatures of the unit and nitrogen cylinder are below 70°, the reading will be lower, if higher the reading will be higher. This method is not recommended for calibrating a unit for methyl bromide, but only for checking.

Working calibration by analysis of measured dosages

A working calibration can be made by placing measured amounts of a fumigant, or of fumigant mixtures, in a test chamber and adjusting the unit to agree to the measured dosage. This method has certain inherent inaccuracies, but readings obtained after such a calibration are very useful in determining the distribution of gases, or the degree of concentration present. It does not account for sorption, and it gives only a reading for the total gases present where two or more components are used in a mixture. Furthermore, it does not indicate whether or not the gases, at the time of measurement, are in the same proportion as in their original mixture.

Working calibrations have been made for the 80-20 mixture of carbon tetrachloride and carbon disulfide, the 75-25 mixture of ethylene dichloride and carbon tetrachloride, the 60-35-5 mixture of carbon tetrachloride, ethylene dichloride, and ethylene dibromide, and the 34-66 mixture of acrylonitrile and carbon tetrachloride.

Supplemental Equipment

Supplemental items of equipment have been devised or adapted to use with the gas analyzer units, including:

1. **Moisture or CO_2 traps.** Traps are made of ½- or ¾-inch plastic tubing closed at each end by

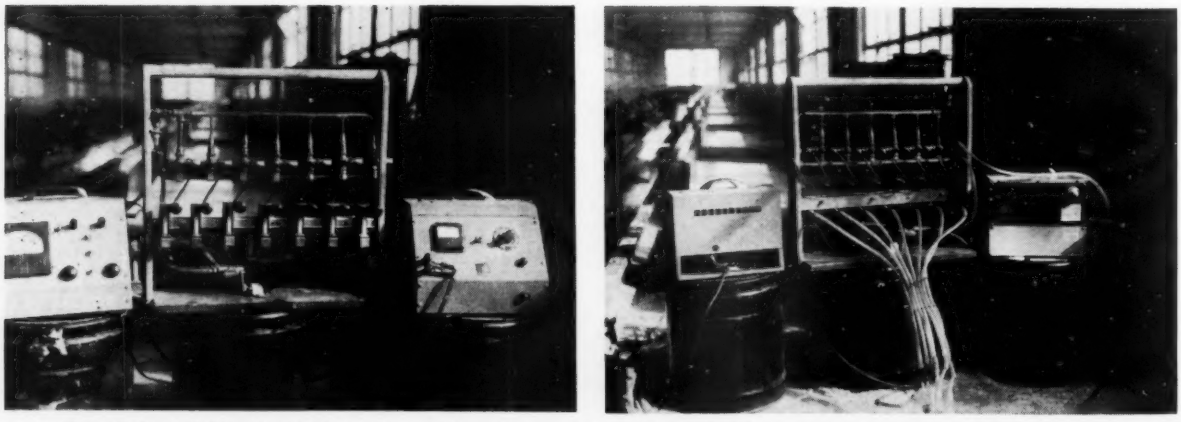


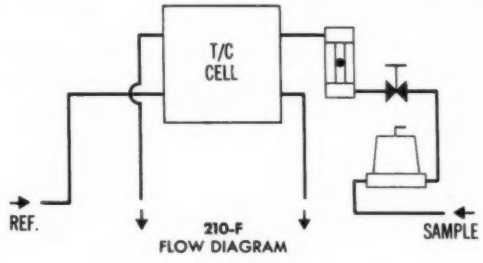
Figure 3. Front (left) and rear (right) views of thermal gas analyzers with manifold for purging long sampling lines simultaneously.

GOW-MAC
FUMIGANT GAS MASTER

-for

- **METHYL BROMIDE**
- **CARBON TETRACHLORIDE COMPOUND** (DOW FUMES)
- **SULFURYL FLUORIDE** (VIKANE)

MODEL 210-F FUMIGANT GAS MASTER

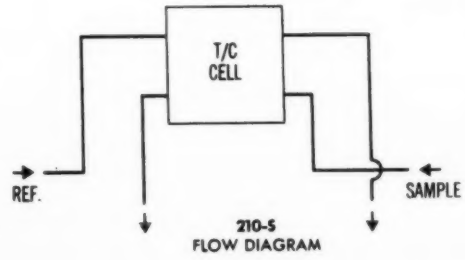


210-F FLOW DIAGRAM

Incorporates a variable volume diaphragm pump (115 V. 60 cy.) with separate switch, and flow gage with needle valve in one pass, leaving the other available for quick zero check on ambient air. Power pack in base. Five controls, meter and T/C cell. Calibrated 0-100 ozs. Methyl Bromide (CH_3Br) in air. Widely used by U. S. Department of Agriculture, A. R. S. for stored products.

Price $305.00

MODEL 210-S STANDARD GAS MASTER



210-S FLOW DIAGRAM

Has all five controls and meter. See diagram for simple two pass gas flow. Dry cell powered. Excellent for portable, intermittent service, such as gas main and other purging operations.

Price $175.00

COMING! **GOW-MAC TRIPLET MANIFOLD**

New Gow-Mac manifold triples efficiency of operator. Six sampling lines continuously purged to serve one Gas Master. Includes matching case.

For Complete Information, Call or Write to Dept. PC:

GOW-MAC INSTRUMENT CO.

100 KINGS ROAD, MADISON, NEW JERSEY

Telephone: FRontier 7-3450

stoppers fitted with a short length of smaller tubing containing a pinch of glass wool. The cell is filled with an absorbent for moisture, or CO_2, as needed, and kept sealed until it is inserted into the sampling line near the unit. The size is adapted to the needs of the operation, but is kept to the minimum because the trap slows up the purging of the line and the rapidity of the analysis in proportion to its size.

2. Step-up converter. When the analysis unit is operated without the helper unit, a converter which will step up 6 volts d. c. to 110 volts a. c. is used to run the air pump to draw samples. This can be purchased at auto supply houses. A 6-volt automobile battery is used as a power source.

3. Manifold for sampling lines. A manifold for purging a series of long sampling lines simultaneously is used, which permits reading in one-third the time necessary when the tubes are purged individually. Each sampling line is fitted with a 3-way valve and a flowmeter (fig. 3). The manifold is connected to a pump of sufficient capacity to purge a number of lines, and the exhaust returns to the fumigation enclosure, or is discharged some distance away. As the time for a series of readings approaches, gas is drawn through all lines and discharged through the manifold. As each line is sampled, the switch momentarily diverts the gas to the analyzer unit and the reading is quickly made. By this means the gas sample is within three feet of the analysis unit at all times. Very long sampling lines are used with no loss of time by this method.

Utilization by USDA

The Department of Agriculture has found the thermal conductivity gas analyzer unit a useful tool in research to improve fumigation procedures, and in insect control and quarantine projects.

Units have been used to study the distribution, penetration, sorption, and time-concentration patterns in the fumigation of shelled corn, wheat, grain sorghum, barley, rice, seeds, and tobacco, in both laboratory and large-scale practical tests. Likewise, studies have been conducted on the rapidity of aeration of these products after fumigation, from the standpoint of both safety to the operators, and post-fumigation effects on the commodity. Units are also in use to study the fumigation of all types of imported plant material and commodities which may require closely regulated gas concentrations to prevent injury.

In khapra beetle eradication treatments where buildings and their contents are covered with large tarpaulins and fumigated, the basis of release is that stipulated minimum concentrations shall be maintained at all sampling points within the enclosure. These are determined by use of gas analyzer units. Minimum concentration levels to be maintained in fumigations of commodities regulated by the khapra beetle quarantine have been established in lieu of prescribed dosage rates for classified types of enclosures.

Helpful Suggestions

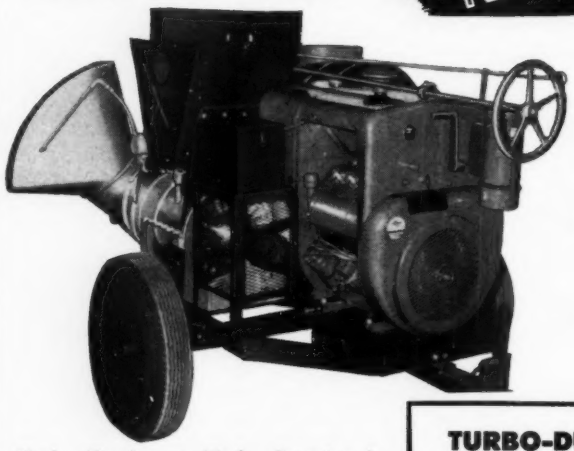
1. Allow a sufficient time for the unit to warm up before beginning to make gas concentration analyses. The unit will stay in balance better and the readings will be more accurate.

2. See that the unit is thoroughly

Longer Lasting, More Efficient, Large-Area Insect Control

by TURBO-DUSTING!

BUFFALO TURBINE



Buffalo Turbine Sprayer Duster Model CS

Sprays or dusts — or both at the same time.

100 gal. stainless steel tank.

Turbo Dusting or Turbo Spraying is the modern, time-saving, material-saving, Buffalo Turbine method, that gives greatest penetration. A powerful "Turbulent Air" blast atomizes and blows spray or dust to give a wider coverage than ever before attained ... yet Turbo Dusting and Turbo Spraying can be controlled to give the desired coverage pattern. All controls are within easy reach of the operator.

These benefits ... plus low initial cost and low maintenance cost, make the Buffalo Turbine Sprayer-Duster the most economical and effective insect control equipment available today.

Write for complete information and prices

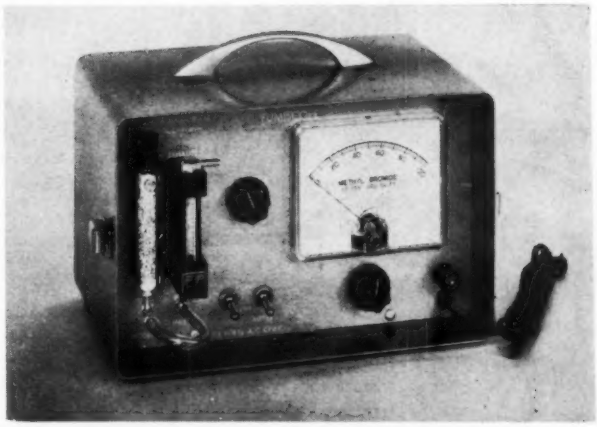
TURBO-DUSTING
Features

- Velocities up to 180 m.p.h.
- 14,000 cu. ft. of air per minute.
- Covers 100 acres per hour.
- Does not spot cars, homes, or windows.
- Penetrates a city block from vehicle on the street.
- Longer residual benefits than fog or smoke.
- Kills more flies and mosquitos at lower cost than any other method.

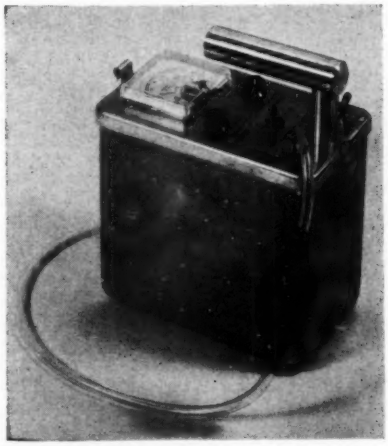
BUFFALO TURBINE
AGRICULTURAL EQUIPMENT CO., INC.
70 Industrial Street • Gowanda, New York

Take the guess work out of Fumigation with a *FUMISCOPE*

A **FUMISCOPE** is an instrument which measures the concentration of Methyl Bromide in a space under fumigation — such as a building, ship, vault, railroad car, or beneath a tarpaulin. A **FUMISCOPE** will tell you how much Methyl Bromide gets where the insects are, and how long it stays there. A **FUMISCOPE** answers the questions: "Is there enough gas to do the job?" "Is the sealing good enough to hold the gas?" "Did the gas penetrate to the presence of the insects?" And these questions are answered while the job is in progress. Failures can be avoided. Residual gas in foodstuffs can be controlled.



The Model E (Above) is both a laboratory and a field instrument. Sensitivities as low as one ounce per thousand cubic feet are obtained. Model E is self contained in one case, complete with power supply for 115 volts, gas pump, flow meter, and sensitive elements. Useful where continuous information is needed.



FUMISCOPE, Jr. (Above) is a battery operated instrument with the same sensitivity as the larger instrument. It is highly portable, for many quick measurements where 115 volt power supply would be inconvenient. The case measures 4"x7"x7". Standard 6 volt batteries last about 50 hours.

☆

Anyone who can read a thermometer can use a **FUMISCOPE**. Only two controls aside from the power switches are needed. A Fumiscope operates by pumping a small amount of air from the space under fumigation through the sensitive element. The concentration shows directly on the meter in ounces per thousand cubic feet. The air samples are usually collected through small tubes placed at critical spots before the introduction of the gas. Information may be obtained from as many places as tubes have been placed.

Write for helpful literature!

ROBERT K. HASSLER CO.

P. O. Box 177 SYcamore 4-2751 **Altadena, Calif.**

The P.C.O. Sprayer that is

Designed to make your job Easier!

Exclusive Saf-T-Lok® design means rugged construction. Stirrup handle for easy carry.

Welded stainless steel tank assures long lasting service, resistance to corrosive solutions.

Entire pump assembly, including cylinder, withdraws as a unit, opening bottom of funnel-shaped cam ring for easy filling. Always safe.

Drip-Not* spray control valve shuts off positively at nozzle tip of 21" brass extension. No waste!

Easy-to-pump action, foot-rest, save work.

You apply sprayable solutions with less effort from a tank of adequate capacity for most jobs when you spray with this 2-gallon HUDSON X-Pert* P.C.O. sprayer. It fills easily, seals securely at a twist of the pump handle, pumps easily and sprays cleanly...no drippings to clean up. The pressure-safe, easy-to-open container and removable pump are easy to clean. Write for latest catalog.

ONE OF A COMPLETE LINE

4- or 3-gal. X-Pert

Lektrik Spray

Suburban Power Sprayer

Peerless Power Sprayers

Made by HUDSON

for the pest control operator

SIGN OF THE BEST BUY

HUDSON

H. D. HUDSON MANUFACTURING CO.

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purged after each period of use or before turning it off.

3. See that the current is set exactly at the specified milliamperage. A current overload will burn out the filaments.

4. Turn the control rheostat completely counter-clockwise when turning the unit off. This reduces the current load when the unit is started again. Turn the control rheostat slowly when starting, until the required current flow is reached.

5. Do not turn the unit off by pulling a master switch or by unplugging and leaving other switches on. If this is done, too much current may be thrown into the circuit upon starting.

6. Do not use a corrosive drier such as calcium chloride in the moisture trap.

7. Always handle the unit carefully. If it is transported by car or truck, use a carrying case lined with foam rubber.

8. Do not use the unit in the direct sun, or where hot or cold winds will blow on it.

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Book Review

Chemistry and Uses of Pesticides

By E. R. deOng

This second edition of Dr. deOng's book is a complete, modern treatment of the pesticide field. It includes information on insecticides, fungicides, herbicides, rodenticides, repellents, and seed disinfectants with much data on chemical and physical properties, toxicology and compatability.

Almost half of the 334 page work is devoted to detailed instructions on the use of synthetic organic compounds. Data on repellents for mosquitoes, biting flies, ticks, and stored product insects is also included.

A valuable dictionary of 500 compounds shows the chemical and common names with brief functional definitions. Authorized tolerances for pesticides are listed as well as those requiring none or zero tolerances.

Priced at $8.75, this work was published in 1956 by the Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

KILL RATS and MICE!

with

Donaco

TRADE MARK

DRY MEAL BAIT

Made with Quaker Breakfast Oats!

Compare this price!

200 lb. Drum only 23c lb.

f.o.b. Denver

Used by Leading Pest Control Operators Throughout the Country

- HIGH PALATABILITY
- MOLD RESISTANT
- INSECT RESISTANT

For complete information write, wire or phone D. W. Cluff

LIQUID BAIT DISPENSER

66c

The only liquid bait dispenser on the market designed specifically for rats and mice. Holds one quart of water. Small evaporation area assures long term effectiveness without frequent refillings. Made of strong, durable Styron. 5¼" high.

DONCO, INC. 1150 W. Hampden, Englewood, Colorado

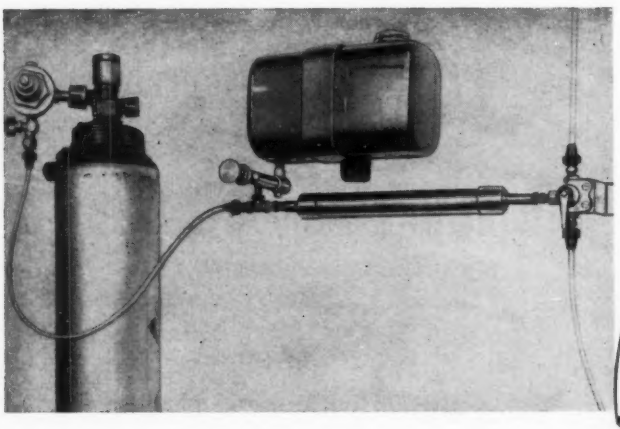
SKEETER-KILL

THE EASY-TO-INSTALL SYSTEM FOR

FLY and MOSQUITO CONTROL

THAT IS

Permanent, Economical



SKEETER-KILL

SPECIFICATIONS

A single unit, enough for treating up to 18,750 cu. ft., consists of one completely assembled non-corrosive insecticide tank, charging chamber, a pre-set regulating valve, release toggle valve, 200 ft. Ace Seran ¼" plastic tubing, 15 nozzles, 34 flare nuts, 2 boxes of staples, one funnel, and complete instructions for installing and operation.

A dual unit, suitable for treating up to 37,500 cu. ft., has one insecticide tank and charging unit, a pre-set regulating valve, release toggle valve, 400 ft. of plastic tubing, 30 nozzles, 68 flare nuts, 4 boxes of staples, funnel and complete instructions.

Typical SKEETER-KILL installation beneath eaves around perimeter of residence for mosquito control.

A Permanent Installation

for

Restaurants	Motels
Dairies	Homes
Warehouses	Swimming Pools
Barns	Camps
Drive-Ins	Paper Mills

Write Today for Pric

Another

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Field Tested and Proved Effective **Comes Complete, Ready to Install** **Trouble Fr**

ives You Profit 2 Ways!

You Profit From Sale of Unit and Repeat Insecticide Sales

aFOG, not a spray
ayrs or bombs to handle

rit and Dealer Discounts

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HMICAL CORP.

Ch ls For Industry

El 3-3960 **Portsmouth, Ohio**

What Is SKEETER-KILL?

SKEETER-KILL is a permanent, safe, non-hazardous and patented fogging installation that is simple for any of your customers to operate once you have installed it. You profit both from initial sale of the units and from repeat sale of insecticides. Can be installed in approximately two and a half hours.

SKEETER-KILL consists of clear plastic tubing that conducts a fog through small, carefully calibrated nozzles located around any room, under counters, sinks, cupboards, eaves, on fences, or wherever continuous flying insect control is desired. It is neither unsightly nor noticeable, can be installed inside or outside of a building. Small chemical tank can be placed in any near-by out-of-the-way place.

SKEETER-KILL is installed permanently on your customer's premises. A normal application with 3 minutes of fogging and 3 ounces of insecticide costs less than 8c and will provide control of house flies, mosquitoes, gnats, fruit flies, biting flies, adult moths, etc.

There is nothing to wear out, thus assuring economical, trouble-free, long lasting operation.

SKEETER-KILL is propelled by a CO-2 tank available from any soda-fountain supply company.

SKEETER-KILL installation in dining room of restaurant for flying insect control.

Harmless to Man and Animals **Non-Corrosive Parts** **Nothing to Wear Out**

NPCA CONVENTION NEWS

National Pest Control Association
24th Annual Convention
October 20-24, Louisville, Kentucky

•

James V. Benschoter, National Chairman
J. Harvey Sturgeon, Local Chairman

Local Group Picking Pleasure Tours to Show Delegates Louisville

There's so much to see and do in and around the '57 NPCA convention city of Louisville, local committeemen are finding it difficult to select those attractions which will be most interesting to delegates.

Included in the possibilities for excursions is a side trip to "My Old Kentucky Home," one to Churchhill Downs raceway, another to one or several of the many distilleries in Louisville, and a visit to Mammoth Cave. A boat trip on the Ohio River is already scheduled and will be included in the registration fee.

Committee in charge of local affairs this year is chaired by J. Harvey Sturgeon, Sturgeon Pest Control, Inc. George M. LaChance of Louisville Chemical Co. is supervising registration to see it goes as fast as possible.

Booth exhibit arrangements are being made by C. B. Smith of Orkin Exterminating Co., and Elmer R. Jones, Jones Pest Control, is in charge of advertising and publicity.

O. L. Myers, Terminix Co., is responsible for planning the entertainment which includes a special "Southern Hopitality Night." Working with him on the Sunday reception is C. J. Sturgeon, also of Sturgeon Pest Control.

Over-all chairman for the convention at the national level is James V. Benschoter of Ben-E-Lene Co. in Toledo, Ohio. His committee includes E. H. Purcell, E. H. Purcell Co., Inc., Ft. Wayne, Indiana, and Herman L. Fellton of Getz Exterminators, Inc. in St. Louis, Missouri.

James V. Benschoter, is national chairman.

Registration Opens Sunday

Registration for the four-day meeting will open Sunday, October 20th in the Brown Hotel. There will be an association Board of Directors meeting early that afternoon and a special reception and tea for all delegates and their wives at 4 p.m.

General sessions will begin promptly at 9 o'clock and run until late afternoon. An extra luncheon with an outstanding speaker is scheduled for Monday, and that evening there will be the "Southern Hospitality Night" mixer with music and refreshments.

On Tuesday, sessions will run until noon. In the afternoon, delegates will board ship for a trip on the Ohio River.

Technical discussions resume Wednesday morning, but that afternoon and evening are open for special sightseeing trips and excursions. For delegates who return to the hotel for supper, there will be a resume of NPCA activities in the evening.

Last formal sessions will be held Thursday morning and early that afternoon. Election of 1957-58 officers takes place about 4 o'clock on Thursday, leaving enough time to get ready for the annual banquet and dance that evening.

Increasing Business Dividends Is Theme for Louisville Meeting

Mix business education, technology, and pleasure and you have a description of what delegates will get out of this year's industry convention. Major emphasis for the National Pest Control Association's 24th annual meeting will be on "increasing business dividends," according to Toledo PCO, James V. Benschoter, national convention chairman. Sessions will be held October 20-24 at the Brown Hotel in Louisville, Kentucky.

As already discussed in **Pest Control,** the industry's contractural responsibilities are steadily increasing. The extent, scope, and legal implications of these obligations are to be explored by expert speakers at one of the first meetings of the Louisville convention.

Personnel and their relations with the public is another topic to be covered under the general theme heading. Other business subjects are to be included, but announcement of them is being withheld until plans and speaker commitments have been confirmed.

On the technology side, there will be authoritative speakers who will address PCOs on termite control, general pest control, sanitation, and repellents.

For entertainment, the committees are planning a program of recreation PCOs and their wives will long remember, including a boat trip on the Ohio River with dinner served aboard.

The Brown Hotel, NPCA convention site.

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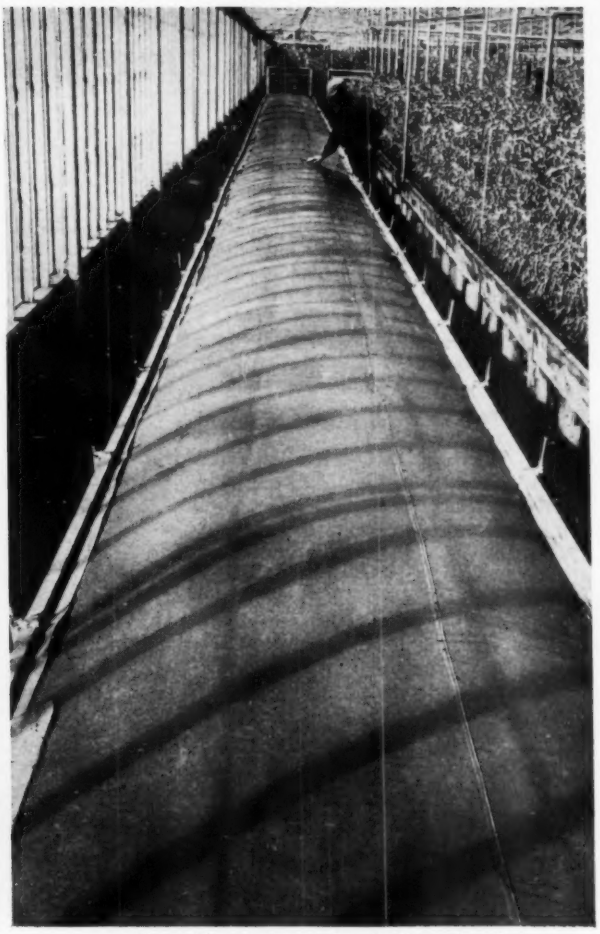

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Specify Fiberthin to your fabricator or send for information to: United States Rubber Company, Coated Fabrics Dept., Mishawaka, Indiana.

*U. S. Pat. No. 2,619,705. Dec. 2, 1952

United States Rubber

CSMA Insecticide Division Votes John Rodda To 1958 Chairmanship

John A. Rodda, sales manager of Fairfield Chemical Division, New York City, was elected 1958 chairman of the Insecticide Division of the Chemical Specialties Manufacturers Association during its 43rd Mid-Year Meeting in Chicago late in May. He will succeed the present chairman, Carlos Kampmeier of Rohm & Haas Co., Philadelphia. Alfred Weed, of John Powell & Co., was made vice chairman.

Other members of the insecticide division's administrative committee selected at the same time are: Mark L. Hill of Gulf Oil Corp., Mr. Kampmeier, and John R. Stoddard of Prentiss Drug & Chemical Co.

All six of the CSMA's six divisions held committee meetings and open sessions for the presentation of formal papers during the three-day conference. Concurrent programs were held on aerosols, automotive specialties, disinfectants and sanitizers, insecticides, waxes and floor finishes, and soaps, detergents, and sanitary chemical products.

Rodents and Food

"It is estimated commensal rats and mice annually destroy, damage, or contaminate more than two billion pounds of grain and other foodstuffs," James B. DeWitt of the U. S. Fish & Wildlife Service's Patuxent research refuge, Laurel, Maryland told the insecticide group at Chicago's Drake Hotel.

The yearly dollar value of damage caused by Norway rats alone exceeds several hundred million dollars; and the losses resulting from mice are greater than that, he said.

Prevention of these economic losses, protection against rodent-borne diseases, and maintenance of acceptable degrees of sanitation in the food industry require the use of effective rodenticides and other control measures, Dewitt told the group of pesticide manufacturers.

Anticoagulants are more satisfactory than older rodenticides. The five now available are warfarin, pival, fumarin, diphacinone, and PMP. "But," he advised, "better or cheaper toxicants and more universal adherence to principles of rodent control and sanitation are needed."

A chemical barrier on the outside of packages that would prevent rodent entry might be a solution to the problem of protection in areas where elimination of rats and mice is impractical.

Although no such rodent repellents have been perfected yet, compounds containing halogen, nitrogen, or sulfur offer greatest promise in this field. A chlorinated ester of furoic acid is reported to be highly effective,

John A. Rodda, New York, newly-elected 1958 chairman of the CSMA Insecticide Division.

DeWitt reported. Cefro, such a rodent repellent being manufactured by Virginia-Carolina Chemical Co., "looks good," the expert said.

'Built-In' Termite Hazards

The location and type of new home construction today, in many cases, almost assures the homeowner he will have his private existing termite colony beneath his home, according to Dr. Ralph E. Heal, executive secretary of the National Pest Control Association.

He told the CSMA Insecticide Division the problem of protecting homes from termite attack has assumed great significance in most areas of the U. S. One important reason is the increasing tendency for man to place his home in the natural habitat of termites: in woodland areas. Another significant factor is the popular acceptance of the slab-on-ground home design, "with or without the warming 'termite blanket' of a radiant-heat system in the slab."

Using colored photographic slides to emphasize his observations, Dr. Heal illustrated the many features of modern construction practices which leave excellent opportunities for termite entry into many new homes.

He showed wooden grade stakes which had not been removed after the slab was poured; wooden covers for built-in ventilation ducts; plumbing openings; filled-porches piled full of lumber trimmings, sawdust, old bags, etc.; and the pouring of a slab in two sections which can leave an opening where the two join.

The value of several previously-recommended methods of protection against termites disappears with the slab-on-ground house. "Termite shields become impractical," Heal said. "Shielding of the foundation wall in slab construction still leaves the full central area of the slab in direct contact with the soil. The inevitable cracks, expansion joints, and utility entrances are common avenues of entry. Carelessness or unwitting flaws in workmanship often provide termites ready access to well designed structures."

Pressure-treated wood is ordinarily used only for foundation framing. "It is effective in deterring decay, but offers very little termite protection for adjacent untreated timbers, finished wood, or furnishings."

A special advisory committee was appointed by the Building Research Advisory Board to study for the Federal Housing Administration practical methods for termite prevention in new home construction.

"While the report of this committee covers many phases of the problems, the most significant contribution on termite control was the recognition of the value of soil treatments as built-in protection against termites. Soil treatment was given preferential recommendation for the protection of slab-on-ground construction against termite attack," the NPCA executive reported.

Will the F. H. A. accept, reject, B R A B recommendations? Dr. Heal said: "The future of the soil treatment in F.H.A. Minimum Property Requirements remains obscure . . . (but) Regardless of the F.H.A. decision, chemical treatment of the soil as built-in protection against termites is currently accepted as of value."

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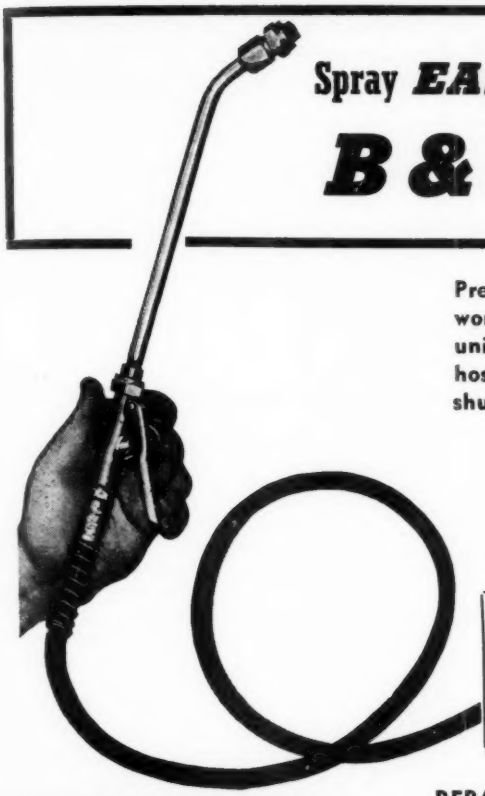

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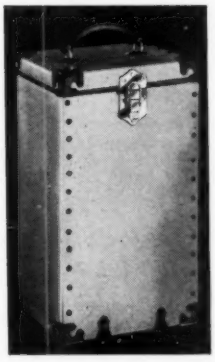

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Food Sanitation More Than Lip-Service; But PCO Service Can Be Improved, Too!

based on information given to the
1956 National Pest Control Association convention by

DR. RICHARD R. MARSH
Department of Food Technology, University of Illinois, Urbana

Is the food processing industry and are food servers really anxious to manufacture and serve their products in the most clean and wholesome environment possible? In many cases, I'm afraid, proclamation of such objectives is nothing more than lip service.

When, and under what circumstances do food industry managers assume an intelligent and active role in achieving higher standards of hygiene? Only when it is economically costly for them **not** to do so.

The reason members of the foods industry maintain certain basic standards of plant and food hygiene continues to be the laws threatening negligent food processors with arrest, property confiscation, seizure, prosecution, confinment, and/or a fine. And agents in the field keep a close look-out for offenders.

When Federal courts began to grant embargoes and to asses prison sentences and fines on management personnel for conditions of environment that might result in food becoming contaminated, failure to attain minimum sanitation standards became expensive. Witness the sudden rise of interest in pest control by the food industry when it was discovered insects and rodents within the plant or on the premises surrounding a plant might be the basis for closing the plant, if not for prosecution under the Pure Food and Drug laws.

I believe we may safely assume the food industry will try to "get by" just so long as its consumers and the health services will permit it to do so.

For the past several years the health services have strived to create a situation wherein they can act as educational agencies rather than policing bodies.

But, there is a need, too, for pest control operators to cooperate with the many food handling firms anxious to maintain sanitary conditions. First, there is a need for better planning of pest control services.

In talks with school lunch and other food servers and processors, I have stressed that it is not good practice to spray food-preparing and serving areas while foods are exposed. Dead and dying flies and roaches may find their way into foods and food utensils, and the spray, settling out of the air, can become an undesirable contaminant of foods and previously sterilized equipment.

Within the past year some managers have complained to me that PCOs insist on spraying during processing and serving times—in kitchens, and in processing rooms of school lunch units and restaurants. This is wrong! One operator is reported to have threatened to charge double his regular fee if he was not permitted to spray at 11:00 a.m. — in the kitchen! PCOs can do a better job of planning their control operations.

New Effervescent tablet form of Heliogen, a diatomic iodine sanitizer that reportedly destroys bacteria, viruses, and fungi in hard or soft water within 15 seconds, has just been introduced by S. B. Penick & Co., Sanitizing Products Division, 50 Church St., New York 8, N. Y. The solution is non-toxic, non-corrosive, non-irritating to the skin, and leaves no odor, Penick says.

Secondly, I believe PCOs can do much to educate their customers in the principles of better housekeeping. Many pest problems arise from a failure to keep inside and outside premises properly cleaned.

On the outside, trash, industrial wastes, wet ground, improper screening, failure to rodent proof, etc. can mean there'll be a greater potential of insect and rodent infestation. If we could only get management to see reasons for keeping the grounds around their plant free from feeding, breeding, and harborage conditions, we could go a long way in "prevention control." Study what can be done, what should be done, show how to do it, and try to demonstrate the results a good outside-the-plant housekeeping program will bring.

Infestations of food plants are a result of poor housekeeping within the plant, too. Improper control of garbage, improper storage, improper cleanup of spillage, failure to keep restrooms sprayed and treated with residual insecticides can and should be called to the attention of management. Areas under and behind equipment where cleaning is either difficult or completely overlooked should be observed by PCOs and suggestions made on how conditions can be improved. Perhaps this will require a great deal of diplomacy.

Thirdly, I should like to see the day when PCOs become operational sanitation service personnel, too. I fail to see how we can separate sanitation, good housekeeping, and pest control in food-processing and food-serving establishments.

I believe it is about time we have less talk, talk, talk, and more action, more action, and more action; and that we begin to get visible results through cooperation between the pest control industry, the food industry, and public health agencies.

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New Approaches to "Sub" Treatment of Slab Houses

By MYRON W. SMITH
Hill-Smith Termite System, Memphis, Tennessee

Not too many years ago, slab construction for residences was a rarity, but the boom in residential building which followed World War II brought this heretofore practically unknown style into wide usage across the country. The new ranch-type building, which hugs the ground, required a low contour line, and slab construction ideally met this structural need.

Architects and builders, anxious to please the new market for homes, jumped into this popular type of construction. Little regard was given to how slabs were laid, for most believed here at last was a termite-proof building technique! Nothing could have been further from the truth, although we must admit concrete slab construction is basically more resistant to subterranean termite attack than conventional construction. Low-slung, basmentless houses do, however, present a new set of problems; the avenues of termite attack are usually concealed. Many home designers and contractors have come to realize there really is no such thing as a termite-proof building.

Lack of Uniform Codes

Designs have changed from time to time as attempts are made to find a better or cheaper way to build slab residences. There is a general lack of standards; at least there was for earlier slab homes.

In some areas of the country, even yet, there are no building codes to spell out how a slab shall be constructed. Federal agencies are, however, setting up their own requirements for minimum construction. Every termite operator should familiarize himself with the Minimum Property Requirements (MPRs) of the Federal Housing Administration. They will become standards for buildings TOs may be called upon to treat in future years.

Because of present-day non-conformity, a TO needs to know what local codes were required when a building was constructed if he is going to give lasting protection.

Many termite control firms no longer estimate the price of a slab job on a square foot basis without taking into account the type of slab they are called upon to treat.

Now more then ever before it is important for the TO to watch carefully all new areas being developed. Generally, a pattern is established in each subdivision and houses in it can be treated accordingly.

We must take into consideration such exterior factors as drainage, plantings, sidewalks and drives, garages and patios, and porches. Each will affect the type of treatment we make. In the past we paid too little attention to the outside factors and did too little exterior soil treating. Exterior soil treatment is probably most important in brick veneer buildings where the brick veneer extends below grade.

New Methods, Equipment

Ten or twelve years ago, it was common for us to drill directly through a slab floor from the top

CHECK LIST

for treating slab residences to control subterranean termites

Construction features to look for:

- Type of slab used (floating, supported, monolithic)
- Fill material used (porous, packed clay)
- Location of heating (radiant pipes in the floor, perimeter under slab; electric; are there air returns?)
- Location of membrane waterproofing
- What's the foundation made of? (poured concrete, concrete block, etc.)
- What's the exterior finish? (brick, frame, stucco, stone, wood panel, metal, etc.?)
- Kind of floors (wood, cork, asphalt tile)
- Type of baseboards (wood, metal, concrete, asphalt tile)
- Expansion joints (where are they and what kind of materials were used?)

Other exterior factors:

- Relation of grade to slab
- Type of plantings present (planter boxes, shrubs, other ornamentals)
- Porch and patio slabs
- Sidewalks, driveways, carports
- Kind of drainage used
- Outdoor plumbing (septic tank, well, etc.)

Treatment required:

Complete, spot, or trial and error

Treatment methods to be used:

- Drilling slab
- Drilling foundation
- Sub-slab fumigation
- Use of grouting-rods
- Veneer treatment
- Outside treatment
- Flooding top of slab
- Correction of hazards (posts, trellises, etc.)
- Permanent pipe systems

Chemicals to be used:

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and then inject our chemical into the sub-slab area. Sometimes this is still the preferred or only method of treating. We also used to simply drill small holes through a finished floor, inject our chemical and allow it to run over the top of the slab, hoping it would seek out any cracks that were present. In most areas of the country, these techniques have been replaced by rodding through foundation walls from the outside.

Our equipment has changed too. A standard tool of our profession in many areas is now an air drill that makes it easier to drill concrete walls. The so-called grouting-rod, commonly used 15 to 20 years ago to treat commercial slabs, has come into its own in residential treatment.

Today, TOs drill a series of holes around a building's exposed foundation and connect their grouting-rods to the chemical source so the chemical can be forced into any desired sub-slab area. An entire fill area beneath a slab floor can be treated in this way.

We have safety devices, such as an electronic attachment for rotary drills, which automatically cut off when our cutting tool touches a piece of metal plumbing or heating pipe. Permanently installed pipe systems are also finding their place.

Fill Dictates Method

Accurate information on how a slab home was constructed enables us to use the proper method of rodding. Slab buildings built over gravel, sand or cinders require a different treatment and a different rate of flow per application than do those in which the slab is poured over a packed clay fill.

For example, a packed clay fill generally requires a relatively slow application rate so the chemical can spread through the clay as it applied. This slower rate of application markedly decreases the tendency of chemicals to "pocket," hence fewer drill holes are needed. However, in sand or gravel, there appears to be no advantage in using a slow rate of application, since this kind of fill absorbs chemical rapidly. Relatively pourous materials do not permit much lateral spread, so it is better to space grouting-rod holes closer together to get more complete coverage.

The final fill under a slab is usually about 6 inches deep, laid on top of native, compacted soil which may be clay or loam or some sub-soil material. The surface of this hard soil pan under the pourous fill has a tendancy to spread the chemical before it can be absorbed into the rest of the soil.

When pourous fill materials are used for the final fill, it is generally believed treatment should be made as near to the slab as practical. This puts the chemical barrier as close to the slab as possible and permits maximum depth of penetration.

Rate of Chemical Application

We find the optimum rate of application for rodding a clay fill is about 2 to 3 gallons per minute, and the pressure at which application is made is unimportant when you use grouting-rods. This is directly contrary to the treatment of dense materials where you drill through the top of a slab, as is commonly practiced in commercial structures.

Grade-Level Slabs

For residences built on a grade-level slab, we have discovered foundations can be drilled and the chemical, applied from the outside. The technique is relatively simple.

From outside the building, close to the grade level, you drill a hole downward through the foundation wall at approximately a 45 degree angle to the fill. Treatment is applied just below the known joint of the slab and foundation wall. The distance between holes may vary, depending upon fill material.

This method obviously will not take care of infestations arising from the center of the slab, but it will do an excellent job on the perimeter area and save the disagreeable task of removing baseboards or doing extensive interior drilling through the slab floor.

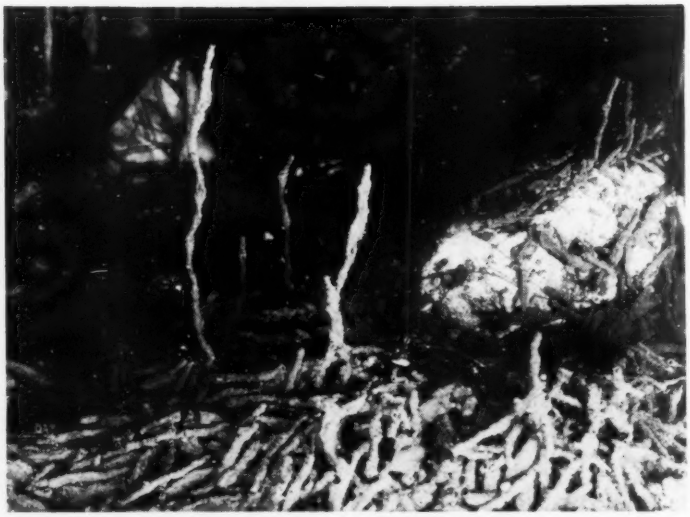
If the foundation wall is of hollow block construction, which is frequently the case, you can insert a short length of pipe, long enough to go through the foundation wall, to prevent pumping all your chemical into the hollow blocks. However, it is also important to treat the inside of the hollow blocks with chemical when you have this kind of foundation.

Spot Jobs

Spot applications will suffice in some slab jobs. Successful treatments have been made by spot applications if the building itself is generally and basically

Termite Picture of the Month

TERMITE "PARADISE"



Try counting the number of termite tubes in this termite paradise discovered by one of our readers in an unexcavated area under a porch he was inspecting. If you have an unusual picture showing termite damage, mail it to us with a short, identifying note, and it will be considered for "Termite Picture of the Month," a photo feature of **Pest Control.** This photograph was furnished by W. F. Exner, Termite Control Company, Webster Groves, Mo.

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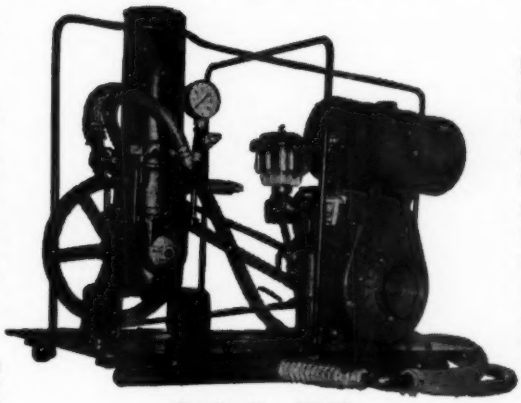

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termite resistant. But this method should only be used where price is a major consideration and when the customer is fully aware that the balance of the building is not protected.

Effective New Chemicals

The newer active-vapor chemicals for termite control have simplified treatment of slab buildings. Older toxicants made it necessary for us to cover the entire area, or at least the area from which termites were entering. Now, however, with such vapor-toxic chemicals as chlordane, ethylene dibromide and trichlorobenzene, this is not as important.

It is generally agreed dosages for slab construction should be increased over those normally used in buildings that have crawl spaces. This does not mean the amount of active ingredient in your formulation should be increased but rather that the concentration can be cut in half and the dosage rate, doubled. This provides greater spread of the toxicant over a larger area.

Recent reports of a couple near-casualties resulting from the use of ethylene dibromide make it probable that use of this material in residential slab treatment will be severely curtailed. The Dow Chemical Company has released toxicity information on ethylene dibromide and methyl bromide which indicates the threshold level for detection of these fumigants by the average person is too high for safety. A study is currently underway, and it is hoped some future clarification can be made soon, concerning the use of EDB and methyl bromide for sub-slab treatment.

There are a number of other materials probably as suitable for sub-slab work. Trichlorobenzene and orthodichlorobenzene were widely used in corrective work many years ago. They should not be overlooked as tools for slab work. True, their action is not as spectacular, but the safety factor is considerably in their favor. The ease with which these chemicals can be emulsified, particularly in lower concentrations, makes them highly useful, especially considering the volume of chemical which should be applied.

Use of oil solutions for corrective slab work has practically been discontinued because the volumes of chemicals required make them expensive and because oils may stain a floor or ruin the moisture barrier beneath a slab.

Best slab treatments in the last few years have been achieved through trial and error methods, and many jobs in the future will be on this basis since we shall not have all construction details at our disposal. It is from this trial and error method we are developing relatively standard procedures for each type of new construction.

As long as architects and builders continue to experiment with new and varying methods of construction, the termite control operator must continue to be alert to what's going on in the building trade so he will be better prepared to give lasting protection when called upon to treat slab-type houses.

Bulging Termite Colonies

Termite colonies have been known to contain as many as three million individuals, according to reports by insect research authorities within the U. S. Department of Agriculture.

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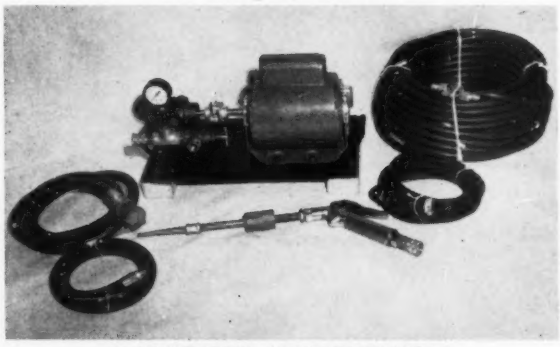

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. . . recommend and use long-lasting dieldrin

Thousands of Pest Control Operators know—in selling termite control—*extended guarantees* and *low cost* are two major considerations for customer satisfaction. When you use long-lasting, economical dieldrin, you can deliver *both*. That's why it will pay you to use dieldrin in your termite control applications.

Dieldrin is long-lasting. Its extended residual action kills termites for many years after application . . . an important feature in safeguarding your guarantee.

Dieldrin is economical and easy to use. Highly effective dieldrin provides sure kill at extremely low dosages per treatment. You can apply it easily as a spray with conventional equipment.

Dieldrin is alkali-stable, too. This is especially important for the control of termites around homes where lime, cement and other alkaline materials are present in the soil.

Build up greater sales and customer satisfaction without expensive callbacks. Use long-lasting, alkali-stable dieldrin in your termite applications. Complete technical information on dieldrin is available. Write to:

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Isherwood Cites 4 Additional Advantages of Crawl Spaces

Crawl spaces or basements in new home construction hold many advantages over ground-hugging, slab-built homes, advantages more important than the mere assurance there will be adequate space for future termite inspections and economical treatment of infestations if they occur.

Henry R. Isherwood, vice president of the Antimite Co., St. Louis, Mo., lists four additional plus factors:

1. There will be proper ventilation, important in home sanitation. Good ventilation efficiently controls water vapors coming from the soil, thus reducing upstairs condensation that can cause damage to rugs, fabrics, etc. and make closets smell musty.

2. Preventive termite measures can be installed easily during construction or at any time afterward.

3. Damage to gas or water pipes, sewer connections, etc. can be more quickly located and repaired at less expense.

4. Service pipes, ducts, wires, etc. needed for new appliances can be more easily installed.

Isherwood points up the health importance of proper ventilation.

"We hear more about this every day from occupants of some very beautiful homes built on slabs costing up to $80,000," he explains.

"Not too long ago on one home inspection, the house owner rolled back an expensive Oriental rug and showed me some mold under it. And the lady of the house added that any time the couple went to a party or dinner, it was necessary for them beforehand to take their clothes out of the closet and air them before putting them on. It is not difficult for anyone to realize how unhealthful these musty odors would be."

These obvious advantages should be as important to the builder as they are to the buyer of a new home for they add to its original value and increase its resalability.

Yes, there are many reasons why TOs should recommend basements or adequate crawl spaces be included in house plans a prospective homeowner is considering, reasons other than those which affect the TO's own welfare.

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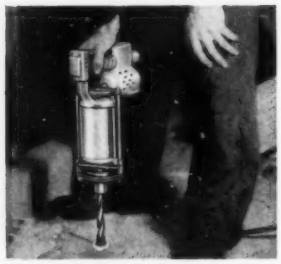
for fast, easy drilling in concrete, masonry, etc.



- **Exclusive, automatic bit rotation**
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- **Low cost maintenance**
- **Use ordinary 115 volt, 60 cycle a-c current.**

SYNTRON Electric Hammer Drills are designed for fast, easy drilling in concrete, masonry and other materials encountered in pest control work. SYNTRON'S Exclusive automatic rotation of drill bits provides ease of handling in any drilling position.
Constructed for long, dependable service, employing the electromagnetic principle, they will maintain their efficiency with a minimum of maintenance. Available in sizes from 5/8" to 2" diameter holes.

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Use of Wood Preservatives In 1956 Exceeds 1955 Demand

About 152,600,000 gallons of creosote were used for wood preservation in 1956, a 1% increase over 1955, according to a survey made recently by the Forest Service in cooperation with the American Wood Preserver's Association, the U. S. Department of Agriculture has announced.

Pentachlorophenol use increased 25% to 13,100,000 pounds to keep the lead among solid preservatives, the Government reported. Second and third solids most used were chromated zinc chloride and Wolman salts.

Approximately 254,600,000 cubic feet of wood was treated during the year compared with 248,400,000 cubic feet in 1955, an increase of 2½%.

The report is preliminary and based on figures received from 310 of the 345 known wood-treating plants in the country, representing most of the preservation industry's out-put. The report does not include preservations applied by amateur "do-it-yourself'ers," however.

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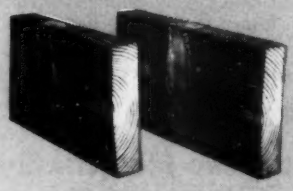
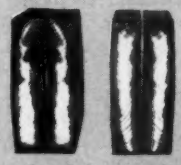
See How Fast WOODTREAT-TC Penetrates!

Southern Yellow Pine penetration test shows WOODTREAT-TC on first day of application.



Four days later. Note diffusion of Penta and oil from point of application to end of plank. Dried crust is almost ready to flake off or be brushed off.



Cross section of above boards at point of application. Penta has made almost complete penetration in 4 days!

It's the talk of the industry! PCO's everywhere say WOODTREAT-TC is the most effective, longest-lasting, most profitable method they've ever used for controlling termites, powder-post beetles, fungus, rot and decay!

WOODTREAT-TC is a brand new idea—a patented oil-in-water emulsion toxic coating incorporating 10% Penta by weight in the oil phase. Its paste-like consistency holds the Penta-oil phase in suspension while it is absorbed deep into the wood in a few days—a ¼" to ½" coating gives penetration equal to 20 brush coats of 5% liquid Penta! Retention is 6 to 11 times greater than application by brush. Surprisingly easy to apply with brush or paddle, it's a real time and labor saver—a real money-maker for you!

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WOOD TREATING

What's NEWS In The Industry

Butts Joins Purdue As Instructor of PCO Course

William L. Butts, 26-year-old Ohio entomologist, has joined the Entomology Department of Purdue University as instructor of the school's four-year course for PCOs. He fills the vacancy that was created when Professor John V. Osmun became head of the Department upon the retirement of Professor Emeritus J. J. Davis.

In addition to his instructional duties, Butts will take part in a university research program on the pest control phases of entomology. Particularly active in entomological research, he participated in a study with the National Pest Control Association on roach resistance in 1956-57.

From 1950-57, he worked part-time for PCO H. K. Steckel in his Tornado Manufacturing Co., Columbus, Ohio. During 1953-57, he also was a research and laboratory assistant in the Department of Zoology-Entomology at Ohio State University, where he received his Master of Science degree with a major in entomology in 1954.

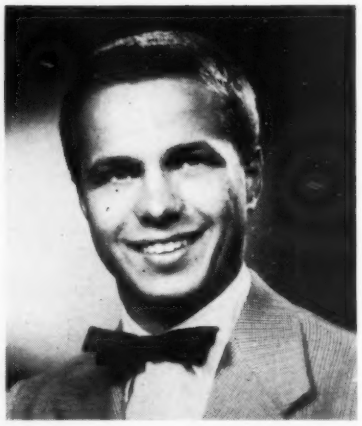
At Ohio State, he was a member of Sigma Xi and of Sigma Sigma Delta, scientific honoraries.

The new instructor graduated cum laude from Wilmington College in Wilmington, Ohio in 1953 with majors in biology and chemistry. He married his wife, Barbara, in September 1954 in Westfield, New Jersey.

Penick Buys Dow Branch

S. B. Penick & Company has acquired the Aromatic Chemicals Compounding department of the Dow Chemical Co. and is scheduled to begin producing and marketing all aromatic blends formerly manufactured by Dow.

Penick is purchasing from Dow the entire physical inventory of merchandise and equipment, formulas, trade names, trademarks, and patents pertaining to the compounding division, a Penick spokesman said. Present compounding and technical personnel will be retained by Penick, and operations will continue at the present location in Jersey City, New Jersey for the present, according to Penick.



William L. Butts, new instructor of Purdue University's four-year curriculum for PCOs.

Diphacinone Registered

Diphacin, new anticoagulant rodenticide previously known as diphacinone, has received Federal registration, according to its manufacturer, the Niagara Chemical Division, Food Machinery and Chemical Corporation, Middleport, New York.

Registration came four years after extensive testing and experimental work carried on by the U. S. Fish and Wildlife Service and Hazelton Laboratories. Diphacin (2-diphenylacetyl-1, 3-indandione) is reported to be a highly active anticoagulant.

NCPCA Conference Set For July 18-20 in Nags Head

A program featuring addresses from industry and government officials and including special entertainment has been planned for members of the North Carolina Pest Control Association attending their Mid-Summer Conference July 18-20 in Nags Head.

To be held at the Hotel Wilbur Wright, the program will include talks from R. Joseph Kowal, Chief, Division of Forest Insect Research, U. S. Department of Agriculture, Southeastern Forest Experiment Station, who will speak on "What do Public Agencies Contribute to the Pest Control Industry?"; Ira Hatfield, Technical Services Director, Wood Treating Chemicals Co., St. Louis, Missouri, who will discuss "Knowledge—One Door to Sales Success"; E. A. Villiers, Franklin Exterminating Systems, Inc., Columbus, Ohio, on "Public Relations in the Pest Control Industry"; and C. H. Daniels, Shell Chemical Corporation, Atlanta, who is to cover "Man and Insects, the World Around."

Entertainment will include a barbecue, a special Gulf Stream fishing trip, and showing of the motion picture, "The Lost Colony," Miss Delia Copley, Durham, executive secretary of the NCPCA, stated.

Rodents No Problem in Texas Flood Areas But Local Observers Cite Mosquito Build-Up

When flood waters left hundreds homeless throughout Texas in May and June, PCOs and health department officials in stricken areas reported there was no major step-up in rodent control problems.

Although rodents were not a problem immediately following the flood, an increase in mosquitoes became evident to local observers.

Col. E. O. Stroube, executive secretary of the Texas Pest Control Association told **Pest Control,** "There has been no increase in rodent infestation and the rodent problem has been negligible throughout the entire state. Fortunately, we had rats and mice pretty well licked prior to these disasters. Each year, reports have indicated an overall decrease in rodent populations."

Even in Lampassas, Texas, reportedly the hardest-hit disaster area in the state, rat populations did not get out of hand, despite a flood of nearly tidal proportions that swept through the small community in early May, "moving 90% of the residences off their foundations."

"The Civil defense Administration telephoned us from McAllister, Oklahoma and Denton, Texas," Milton Caroline, Acting District Agent for the U. S. Department of Interior, Fish and Wildlife Service, San Antonio, said, "and asked for immediate assistance in control of rats in

Lampassas to prevent typhus fever and anything else these rodents carry. We did not expect any serious problem from this course since the city has maintained an active rat control program for several years, and the PCO industry has been quite active.

"Had there been a heavy rat population, we would have 'plastered' the place with anticoagulants. And if the situation had been really serious, we would have used Compound 1080 after all civilians were ordered out of the area each night. It would have been a perfect place to do so because there were almost enough civilian and military police on hand to guard each building."

As it was, he said he found only one infestation, and that consisted of Alexandrine rats in a building.

"Thirty-six hours after we exposed an anticoagulant cereal bait, in the building, we found three dead rats," he reported. "On occasion, our people have found dead rats as early as a day following exposure of this type of bait. No other buildings showed signs of infestation."

During Caroline's inspection of the Lampassas area for rats, the local radio station there agreed to broadcast to residents the need for reporting any rats or mice they might see. After the station made the announcement about 75 times, only three persons reported mice, the Federal F&WLS official noted, and all three residents admitted they had seen the mice before the flood, as well.

"It was not difficult to see why the business district was relatively free of rats. Practically every place had some type of rodent control apparatus or material which could be seen when goods were removed from shelves and when food was hauled away. It appeared to us liquid anticoagulants were in the majority, but there were also signs that some 1080 had been used."

Not so surprising was the increase in mosquito troubles caused by the inundation, according to first-hand reports from several PCOs throughout the disaster areas.

"Every house here is loaded with mosquitoes," Clayton Wright, C. Wright & Associates of Dallas, said during the height of the flood in his area. "But there hasn't been any fogging in Dallas. Householders are using aerosol bombs. We bought a new Dyna-Fog in March and still haven't had a chance to use it."

Asked if there was any cooperation between PCOs and public health officials in control programs, one Texas operator responded that "a little friction" existing between the two interests hampered efforts to work together.

"They (local health authorities) want no help," he said. "They have their own funds, are buying their own equipment, and apparently do not care about calling in PCOs. Our company offered to work one day free just to see what would be involved in control measures, but the city turned us down."

This "little friction" may be resolved if current plans of the Texas Pest Control Association crystalize. Col. Stroube said an association disaster committee is working with Civil Defense authorities on a plan to assure cooperative rodent and pest control protection over a city-wide area in time of such disasters. As yet, the program has not jelled, he indicated.

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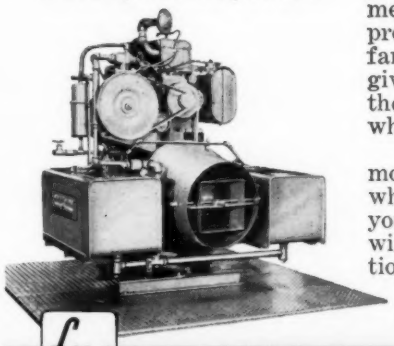
with the **John BEAN** Pestaire

- **11,000 cubic feet of air per minute at 85 mph velocity.**
- **360° rotation on rugged turntable base.**
- **Royalette high pressure pump handles all types of spray materials — including wetable powders.**



Now, at reasonable cost, you can have equipment that's designed for spraying parks, playgrounds, school grounds and all types of recreational areas that require large-scale fly and mosquito control.

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Available either for pickup truck mounting or as an independent two-wheel trailer unit, the Pestaire offers you a combination of big capacity, with compactness and ease of operation that no other sprayer can provide.

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Please send me: ( ) Pestaire Specifications ( ) Spray Concentration and Gallonage Data. ( ) Mist Sprayer Comparison Table ( ) Mosquito Control Costs

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Notebook

TIPS AND IDEAS FROM THE FIELD

Is Employee Contract Binding?

If you have a contract with one of your servicemen who agrees that when he leaves your employ he will not go into competition with you in the same area, is such a contract binding? It is according to a ruling handed down by a Pennsylvania judge in 1953. Here's the case the Pennsylvania decision was based on:

Mr. Oswald's pest control business was so good that he signed a carefully worded contract with Calvin to work for him.

When the contract expired, Calvin opened his own business across the street from Mr. Oswald's shop.

"You can't do that," Mr. Oswald protested. "If you read our contract carefully, you will find that you agreed you wouldn't engage in a competing business for one year after our contract ended."

When Calvin turned a deaf ear to him, Mr. Oswald went to court to enforce the restriction.

"It's unenforceable," Calvin's attorney insisted. "The pest control business is the only occupation my client knows. Certainly a man can't legally be prevented from working."

The court ruled against Calvin. It said a restrictive clause in a contract will be enforced if reasonable. In this case, the court concluded, the restriction is not unreasonable since there is nothing to prevent Calvin from working in another neighborhood.

Defines Flood Boundaries

(from page 6)

not even begun to approach a flood condition. This situation pertains to the "Panhandle" to our north and the Edwards plateau region south of us. Amarillo, for instance, has recorded something like 6 inches of rain so far this year; ours is about 5½ inches. The region south of us, except the Rio Grand Valley, has had even less.

As I understand, the areas around Dallas, Wichita Falls, Fort Worth, Waco, and Houston have been designated disaster areas and, therefore, are under the direct control of the state health department.

Lou Brown

Atlas Pest Control Service
Lubbock

Illinois PCA Hears Heal On Resistance

"There is a greater return to the use of sodium fluoride for the control of resistant roaches than we first realized," Dr. Ralph E. Heal, NPCA executive secretary, told 28 members of the Illinois Pest Control Association. A special dinner meeting was held May 22 at the Merchants and Manufacturers Club at the Merchandise Mart in Chicago to coincide with Dr. Heal's appearance on the CSMA program at the Drake Hotel a day earlier.

"Increased use of sodium fluoride makes it necessary for us to remember the powder must be very finely ground, should be colored, and must be aerated before use," the speaker said. Use of diluents needs to be reappraised, but concentrations should not be cut below 50%. Pyrethrum

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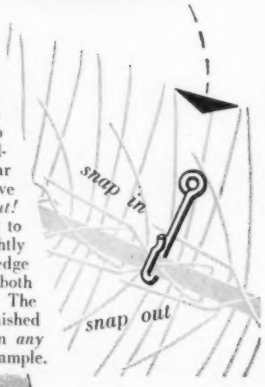
PERMANENT— yet removable!

Nixalite Bird Barrier and Repellent rids buildings of birds permanently — yet it is instantly removable for window washing, painting, cleaning, at expiration of lease, or for any reason whatever. How? Nixalite's resilient stainless steel Clip *makes it a snap!* During installation, you snap Nixalite's base bar into the steel Clip. Want to remove the Nixalite? Simply *snap it out!* The Nixalite Clip® is engineered to hold the Nixalite base bar slightly above the surface of a building ledge to permit the flow of rainwater both under and over the base bar. The correct type of fastener is furnished with the Clip for installation on *any* material specified. Send for sample.



8 *pages in Sweet's Architectural, Light Construction, and Industrial Construction Files, and in Building Specialties Manual are devoted to Nixalite.*

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. . . And that's just what flies do when they contact this high potency, non-toxic formula made expressly for commercial and industrial use.

- Treats 1000 Cu. Ft. in 2 sec.
- No spotting, fine spray
- Controlled spray— No waste
- Suitable for use in both small & large areas of several hundred cubic feet or more.
- In ¾, 1¼, and 3 lb. sizes.

DON'T FORGET ORB LIN-SPRAY — COMPLETELY ODORLESS, TERRIFIC FOR CARPET BEETLE CONTROL

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Write for prices and details.

ORB INDUSTRIES Wallingford Rd., Media, Pa.

powders give no added value to sodium flouride when the two chemicals are combined for roach control, Heal observed.

Diazinon seems to be the preferred phosphate insecticide for resistant roach control.

It was reported PCO Bill Gresham of Tampa, Fla., used a malathion larvacide for flies on a turkey farm and definite resistance to the phosphate was confirmed by the Orlando lab of the USDA. Heal predicted there would be widespread resistance to organic phosphate insecticides within a couple of years.

George R. Chamlin, president of the state group, made arrangements for the meeting and served as program chairman. Dr. Heal was introduced by James J. McDaniel, NPCA regional vice president from Chicago.

Burke to A-M Managership

Dewey Miller, president of the A-M Pest Control Service, New Orleans, Louisiana, has appointed Paul V. Burke general manager of A-M, it was announced recently.

Calendar

North Carolina Pest Control Assn. Mid-Summer Meeting, Hotel Wilbur Wright, Nags Head, July 18-20.

Ohio Pest Control Assn. Mid-Summer Meeting, Rising Park, Lancaster, August 2-3.

Virginia State Pest Control Assn. Summer Meeting, Cavalier Hotel, Virginia Beach, August 23-24

Western Pennsylvania Pest Control Assn. September Meeting, site undetermined, Pittsburgh, 8 p.m., September 12.

Tennessee Pest Control Assn. Annual Meeting, Noel Hotel, Nashville, noon, Sept. 20.

Iowa Pest Control Assn. Fall Meeting, Chieftain Hotel, Council Bluffs, Oct. 3-4.

Missouri Pest Control Assn. Fall Meeting, Student Union, University of Missouri, Columbia, Oct. 7-8.

International Assn. of Milk and Food Sanitarians 44th Annual Meeting, Brown Hotel, Louisville, Ky., Oct. 8-10.

Second Annual Sanitation Maintenance Show and Conference, Navy Pier, Chicago, Ill., Oct. 14-16.

National Assn. of Bakery Sanitarians Seventh Annual Meeting, Hotel Morrison, Chicago, Ill., Oct. 14-17.

National Pest Control Assn. Annual Convention and Trade Show, Brown Hotel, Louisville, Ky., Oct. 20-24.

Pest Control Operator's Short Course Virginia Polytechnic Institute, Blacksburg, Nov. 6-8.

Nebraska Assn. of Pest and Termite Control Operators Fall Meeting, Castle Hotel, Omaha, Dec. 5-6.

Chemical Specialties Manufacturers Assn. 44th Annual Meeting, Hollywood Beach Hotel, Hollywood, Fla., Dec. 9-12.

Roach Insecticide Experiments

(from page 12)

group. Although Dipterex and Dow ET-14 did not give as high a reduction of live roaches in the homes, they retained their toxicity longer than either Diazinin or malathion.

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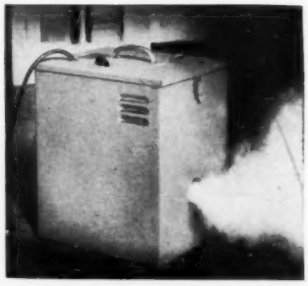

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San Diego Exterminating Co.
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Delk Pest Control
3405 E. Tulare St., Fresno, Calif. ..... (5)

Write for names of other users in your locality

Many large P.C.O.s now have over a dozen PESTRON Units — after they started by purchasing one Unit — **and here is WHY:**

- No fire hazard
- No oily film on furnishings
- No mixing of chemicals
- Only one filling necessary per day
- Use pure, dry Lindane, effective against all household insects.
- No lingering odor
- Portable

ORDER TODAY! Prove to yourself that PESTRON will do the job better! With optional Timer, $198.50 (without Timer. $176.50), F.O.B. Los Angeles. New stainless steel model. Guaranteed against defects for 1 year after purchase.

PESTRON Pest Control Products Co.
6201 Santa Monica Blvd. Los Angeles 38, Calif.

New ACME *Full Vision* "SPEC" MASK

At Last . . .

Gas Mask Protection For Eye-Glass Wearers

If you wear eye glasses, you no longer have to put up with the hazard of ill-fitting gas masks worn over your regular spectacles. This exclusive new Acme "Spec" mask now gives you a face piece with all the proved Acme safety features PLUS built-in eye glasses ground to your individual prescription.

You can get the Acme "Spec" mask complete with personal lenses by sending your doctor's prescription with your order. Or, if you prefer, the mask can be furnished with stirrup bracket and front ready for your doctor to mount your proper lenses.

Either way, you get the perfect vision, safety and comfort along with the Acme advantage of one face piece serving multiple uses.

For details on this timely Acme development, write for Bulletin No. 576 and No. 576-A (Prescription Form).

ACME PROTECTION EQUIPMENT COMPANY

1225 Kalamazoo Street, South Haven, Michigan

Infestation Report

Contains pertinent portions of the Department of Agriculture's **Cooperative Economic Report**, material from university entomology departments and reports from readers. PCOs noticing infestations in their own areas are urged to communicate with **Pest Control** so their information may be added to this infestation report.

BLACK FLY

Iowa: Annoying at Ames. **Maine:** Heavy emergence of Simulium spp. statewide. **Maryland:** Simuiium jenningsi annoying humans at Great Falls, Montgomery County. **South Dakota:** Simulium spp. adults abundant along Big Sioux River in Lincoln County. Several adults in light trap at Brookings.

BOXELDER BUG

(Leptocoris trivittatus)

Utah: Overwintering survival high. Annoying in homes and buildings.

CARPENTER ANT

(Camponotus laevigatus)

Idaho: Extremely abundant throughout northern area.

IMPORTED FIRE ANT

(Solenopsis saevissima v. richteri)

Alabama: Some instances of undermining of railroad tracks reported. **Arkansas:** Approximately 12 square miles west of El Dorado seriously infested. Colony reported in nursery at Magnolia, Columbia County. **Georgia:** Infesting Bleckley County. **Mississippi:** Infestations reported for first time in Adams, Jefferson, Claiborne, Franklin, and Lawrence Counties. **South Carolina:** Collected in Charleston.

TABANIDS

(Tabanus spp.)

Maryland: Deer flies biting readily in areas along Choptank River.

TERMITE

Iowa: Swarming in southern half of state. **Oklahoma:** Swarming in Stillwater area. **Pennsylvania:** Numerous requests for information. **Texas:** Continue to swarm in northern area. **Washington:** Reticulitermes hesperus flights in Prosser.

TICK

Indiana: Active and troublesome in wooded areas in Tippecanoe County. **Iowa:** Exceedingly numerous this spring. Common in woods and brush. **Kansas:** First specimens this spring found in Haddam, Washington County. **Maryland:** Present many places. **Minnesota:** Apparently quite abundant. **North Dakota:** Abundant along Red River. **New Jersey:** Coming out in numbers. **Rhode Island:** Extremely heavy infestations on willow at Hope Valley. **South Carolina:** Numerous at Clemson. **West Virginia:** Abundant on man and animals in Mineral County. Numerous on man in Mason County. **Wisconsin:** First observed in Iowa County. Medium to heavy in 16 counties. Apparently more numerous in Langlade County than for years before. Heavy populations in Iowa and Pierce Counties.

Double Duty VAPORIZER

KILLS INSECTS and ODORS BOTH at the same time

Controls insects with Lindane
Controls odors with Chlorolin

This attractive porcelain unit is UL Approved and carries $100,000 product insurance. It is quality built with a Westinghouse Thermostat and Chromolox Heating Element. It's portable, too! Use it anywhere insects or odors are a problem. Guaranteed for 2 years.

UNIVERSAL ORTHO LINDANE

Guaranteed fresh for high potency, and better kill from any vaporizer. Comes in 1 oz. heat sealed, leak-proof packets or in 1 lb. cans. Write for new lower prices and literature.

Universal ELECTRIC PRODUCTS CORP

P.O. Box 3216 4200 So Mendota St.
Madison 4, Wisconsin

TRIGGER *TeeJet*® SHUT-OFF VALVES

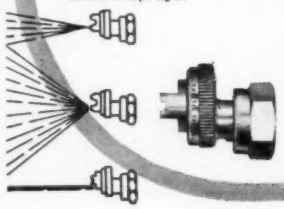
Light weight, balanced, snug hand-grip. Lock catch and positive shut-off.

Supplied with complete choice of tips, and connections.

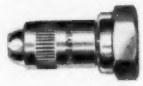
Pick the tools to fit the job

EXTENSIONS—Straight and curved extensions in choice of lengths from 8" to 48".

MULTEEJET TIPS—tip indexes to give medium and fine flat sprays... and medium and solid straight stream sprays.



ADJUSTABLE CONEJET TIPS



Tip rotates for spray selection from fine solid stream... to wide angle, finely atomized cone spray.

For information write for Bulletins 76 & 72.

SPRAYING SYSTEMS CO.

3221 RANDOLPH STREET
BELLWOOD, ILLINOIS

THE GUARANTEED BIRD REPELLENT

Positive: Birds will not perch any place BIRD-RID has been applied. It is water repellent, will not wash away, will not freeze nor melt.

Economical: A little goes a long way. A pound will cover approximately 15 to 20 lineal feet, 2 inches wide.

Legal: Will absolutely not kill or injure the birds, but will repel them from perching, if used as directed.

Safe: BIRD-RID is non-toxic, odorless, harmless to persons applying it. It is entirely non-inflammable.

FOR: LIBRARIES - STORE SIGNS - CONVEYANCES RESIDENCES - STATUES CHURCHES - OFFICE BUILDINGS - THEATER MARQUEES.

May be purchased in Caulking Cartridges, Quarts, Half Gallons, Gallons, Five Gallon Pails, and Fifty-five Gallon Drums. Also Caulking Guns available for cartridges.

Also Available
Liquid Tree Spray

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A Division of A-Veri-Best Exterminators
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Phone: KEnwood 6-2233

DYNA-FOG* JR.
TRADE-MARK

ENDS *INSECT PROBLEMS* for

Mosquito Control Districts • Dairies • Ranches • Industrial Plants • Bakeries • Schools • Warehouses Golf Courses • Mills • 31 Different Known Applications!

- **Weighs just 19 lbs.**
- **"Out-fogs" anything in its class—extremely dense insecticidal fog output at rates up to 15 gals. per hour.**
- **Fog particle size selection from 0.5 to 75 microns.**
- **Only 1 moving part. No lubrication required.**
- **Easy starting, Economical and simple to operate.**
- **Safety assured by new automatic formulation shut-off valve**

Cost: $289.50 f. o. b. Bedford, Ind.

WRITE FOR MORE DETAILS

Note: For "Heavy Duty" Insecticidal Fogging Jobs — Ask About Our 100-Lb. Dyna-Fog. Does same Jobs as 650 lb. and Heavier Machines.

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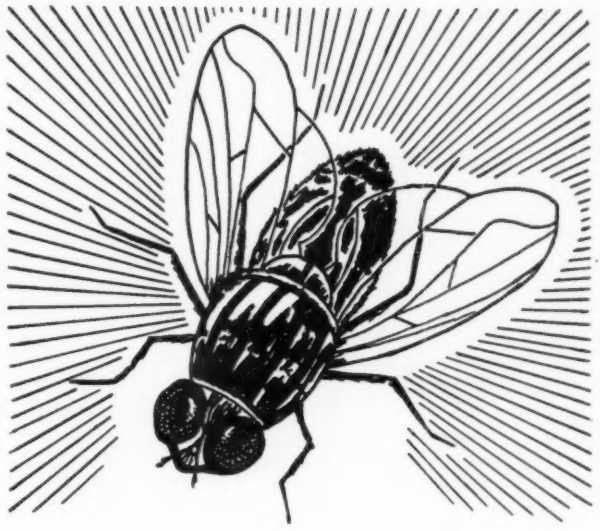
Dyna Products Division
P. O. Box 232-A
Bedford, Indiana



Get Set For Fly Control Problems . . .

use *Hopkins* MALATHION

It's one of the safest insecticides to handle. It's safe for you, but deadly to flies, EVEN FLIES RESISTANT TO DDT, LINDANE, METHOXYCHLOR. P.C.O.'s say that because of its effectiveness for fly control, HOPKINS MALATHION is the cheapest product they can use. When used as a sugar-bait spray, you get good residual control for up to 30 days. Available also as a 25% wettable powder. Deodorized formula available.

HOPKINS WARFARIN PRODUCTS

Leading P.C.O.'s find that they reduce costly CALL BACKS to a minimum. Hopkins Warfarin Products are time-tested and have proven tops for effective rodent control.

For more information on Hopkins products, write:

Hopkins
AGRICULTURAL CHEMICAL CO.
Madison, Wisconsin

MOTH CHEK

5 YEAR GUARANTEED

MOTHPROOFER

Many Pest Control operators are realizing extra profits with the new 5 Year Guaranteed MOTH CHEK Mothproofer due to the vast increase of new homeowners who are anxious to protect their new carpets and upholstery from the ravages of moths and carpet beetles. Chek Chemical Products Co., issues a 5 Year written guarantee and assumes 100% liability in the event of a claim. Tested and proved by the laboratories of the U.S. Testing Co., and the National Institute of Drycleaners.
Results of tests available on request.

• • •

Also available, the new liquid FLAME CHEK which offers a tremendous profit potential in the application of Flameproofing in hotels, motels and other institutions.

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Now available, Chlordane, DDT, Dieldrin and many other concentrates for P.C.O.'s.

Write for complete information and prices

CHEK CHEMICAL PROD. CO., INC.

Dept. PC 10, 89 Madison St., Newark 5, N.J.

MARTINDALE

PROTECTIVE MASKS

PLACE HEADBAND WELL UP AROUND HEAD TO KEEP FROM SLIPPING DOWN
PRESS NOSE TABS IN CLOSE AGAINST FACE TO HOLD PAD AGAINST THE NOSTRILS
PRESS EDGES OF FACE PLATE DOWN TO FIT FACE SNUGLY

Clean, cool, comfortable, excellent protection against non-toxic dusts except free silica. Replaceable cotton pads are inexpensive and sanitary.

Protective Masks . . . . . $.30 ea.
No. 1 Refills (standard wt.) .02 ea.
No. 2 Refills (heavy wt.) .02½ ea.
Masks packed in individual envelopes.
Refills packed 25 to a box.
No. 2 Refills (heavy wt.) contain twice as much filtering cotton as No. 1

DISCOUNTS

Less than $10.00 list . . Net
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Minimum charge or C.O.D. $2.00
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If payment accompanies order we will pay parcel post or express charges.

MARTINDALE ELECTRIC CO.

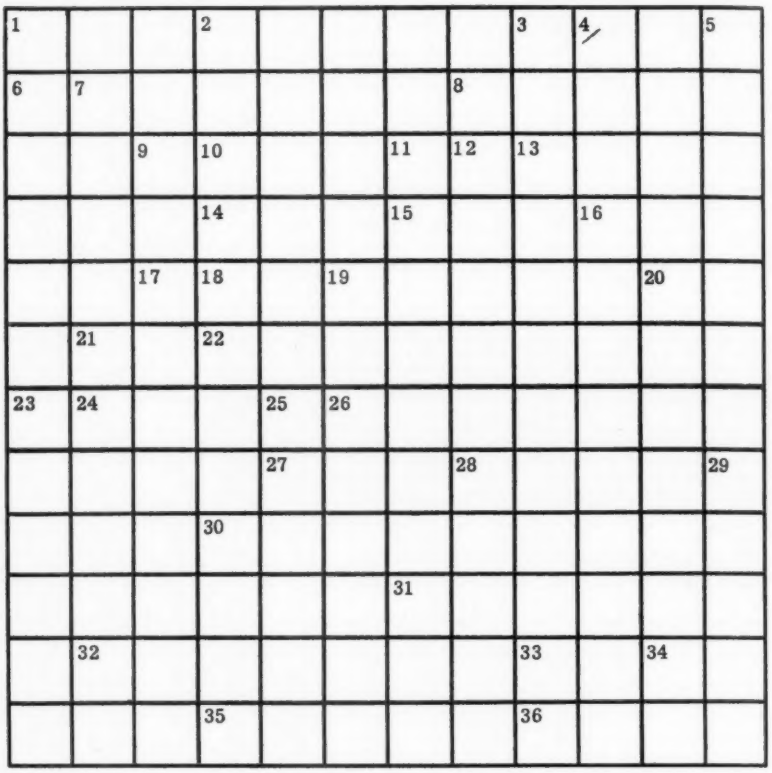
1367 Hird Ave. Cleveland 7, O.

Primer

PEST-O-GRAM 4

By D. CARL LELLA

How familiar are you with terms and abbreviations used by PCOs? Under each "Across" and "Down" heading below is a list of descriptive phrases preceded by a number designating the square in which the needed word begins. To the right of each phrase, in parenthesis, is the number of letters each definition requires. Just work the Pest-O-Gram like a regular crossword puzzle. Begin with the square numbered for each term and print in the word (one letter to a square) that you think best fits the phrase. The next Pest-O-Gram of the series will be published in September.



ACROSS	Letters Required Across
1. Movement of vermin	(9)
4. Barrel (abb.)	(3)
6. Pertaining to water	(7)
8. Organ of smell	(4)
9. Principal food of the Lyctus beetle	(6)
13. Shed or molt	(4)
14. Moving window frame	(4)
15. Insect preferred climate	(3)
16. Termite operator (abb.)	(2)
17. Meshed fabric	(3)
18. Et cetera	(3)
21. Egg louse	(3)
22. Coal tar pitch	(3)
24. Preventive treatment (abb.)	(2)
25. Laboratory (abb.)	(3)
28. Snake teeth	(5)
31. Prefix meaning with, along with	(3)
32. Insect egg case	(7)
34. Advertisement (colloq.)	(2)
35. Organism before emergence	(6)
36. Hard durable wood	(3)

DOWN	Letters Required Down
1. Larvae of flies	(7)
2. Noxious Vertebrates	(4)
3. Opposite of diurnal	(9)
5. 384 Special	(7)
7. Only one in a beehive	(5)
9. Important factor in fly control	(10)
10. This fly causes African sleeping sickness	(6)
11. Fumigant vaults	(8)
12. Musca Domestica (2 words)	(8)
16. Large hairy spider	(9)
19. Type of lice	(4)
20. Black death	(6)
23. Protective fly barrier	(6)
24. Venom	(6)
26. Lessen; diminish	(5)
27. Cold blooded animal	(4)
29. Easily distributed mice baits	(5)
30. Rat Ectoparasite	(4)
33. Negative	(2)

Answers on page 52

THE FAVORITE WITH P.C.O.s

IDICO STAR pistol type SPRAYER

It is light . . . compact . . . with the easy hand grip and control—no dripping.

Trigger Operates High Pressure Hydraulic Piston . . . With Ease . . . No Heavy Pumping.

Equipped with 1 quart brass bottom container. Large opening for easy and convenient filling.

• Can Be Used With All Type Liquids—Oils, Water, Emulsions, Deodorants, Moth Proofing Solutions, Etc.

INTERCHANGEABLE NOZZLES

1. Fine Fog.
2. Penetrating Pin Stream That Reaches 20 Feet or More.

AVAILABLE IN THE FOLLOWING MODELS

1. Straight Extension	B1	**$10.25**
2. Swivel Directional Extensions	B3	**10.50**
3. Both Straight and Swivel Extensions	B4	**10.75**

On orders of 6 or more units — 10% discount.

For all-copper containers for any model add $1 to each sprayer price.

WARRANTED TO GIVE LONG UNINTERRUPTED SERVICE AND USE

So Rush Your Order in TODAY!

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NEW...and IMPROVED
WELL CONSTRUCTED
POWDER GUN

60¢ EACH

F.O.B. Atlanta, Ga. Plus Parcel Post and Sales Tax Where Applicable

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713 West Peachtree St., N.E.
Atlanta, Georgia

ORKIN Since 1901

WORLD'S LARGEST PEST CONTROL COMPANY

MICE GLUE
GETS MICE LIKE FLYPAPER GETS FLIES

7½ lbs. $1.00 per lb. 25 lbs. $.90 per lb. 100 lbs. $.80 per lb.

BIRD-REPELLENT
Keep Pigeons, Starlings and Other Birds from Buildings

7½ lbs. $1.00 per lb. 25 lbs. $.90 per lb. 100 lbs. $.80 per lb.

PEST CONTROL CHEMICAL CO.
324 Broadway Write for details Buffalo, N. Y.

BE SAFE! BE SURE!

With the ONLY

NON-PETROLEUM BASE
NON-INFLAMMABLE
NON-ACID, NON-TOXIC

GROSLEY'S ORIGINAL

"NO ROOST"®
STARLING TREE SPRAY

Prevents
STARLINGS, SPARROWS, AND OTHER BIRDS FROM ROOSTING IN TREES, VINES OR SHRUBS

- **Repels pigeons, starlings, seagulls and other birds from difficult-to-reach areas on buildings and structures.**
- **Deters clover-mites from entering buildings.**
- **Repels climbing and creeping insects.**
- **Repels snakes and rodents from debris.**
- **Milk-white color lets you see where you have sprayed. Avoids costly re-spray. Vanishes after application. Trees and leaves return to original color.**
- **Does not clog pores—lets trees "breathe".**
- **Water repellent and temperature resistant. Can be applied at any time of the year.**
- **Safe, easy-to-apply. Remarkably long-lasting.**
- **Harmless, non-toxic, odorless. Complies with city, state and humane laws.**

EXCLUSIVE DISTRIBUTORSHIPS AVAILABLE

PIGEON CONTROL COMPOUND

This non-poisonous gelatin chemical compound effectively eliminates the "bird-pest" problem. Makes it a physical impossibility for pigeons and other birds to roost on any building or structure where formula is applied. Long-lasting, safe, economical. Proven successful throughout the U.S. and Canada for many years. Approved by leading PCO's. Also available from Federal Supply Service Stock No. 51-R-684.

Available in 1 gallon, 5 gallon and 55 gallon drums and cartridges for caulking guns

YOU ARE SAFE AND SURE WHEN IT'S FROM AEGIS, ONE OF AMERICA'S OLDEST BIRD-PROOFING FIRMS

Send today for full particulars

Aegis Laboratories, Inc.
BIRD CONTROL ENGINEERS
6817 S. Stony Island Ave., Chicago 49, Illinois

Classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum, $1.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher at least three weeks preceding publication date and be accompanied by cash or money order covering full payment.

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IMMEDIATE OPENINGS for pest control operators, with "top" experience, in our Caribbean offices. Permanent and temporary positions available. High salaries, maintenance and transportation furnished. Unusual opportunities. Write or wire immediately L. L. Crosby, president, Commonwealth Sanitation Co., 3567 Bigelow Blvd., Pittsburgh 13, Pa.

OPPORTUNITIES UNLIMITED. The world's largest pest control organization (AAA-1 rated) has interesting openings for men with initiative and ambition. We operate in 28 states from coast to coast and there are opportunities open in many phases of our operation . . . servicemen, managers, technical representatives and salesmen. Experience in professions related to pest control helpful, though not necessary. Liberal salary and incentive arrangements provide unparalleled opportunities for men with good judgment and the ability to get along with people. Our firm, over 50 years old, offers employee benefits including paid vacations, sick leave, life insurance, hospitalization and pension plan. All replies confidential. Interviews in Atlanta at our expense. Write in detail to Orkin Exterminating Company, Inc., 713 Peachtree Street, N.E., Atlanta, Georgia. Attention: Personnel Department.

AMBITIOUS MAN qualified to assume sales service position leading to branch managership. Opportunity to get in on ground floor of expanding organization. Write Anderson Exterminating Co., 1735 W. Jackson Blvd., Chicago 12, Ill.

ENTOMOLOGISTS with structural pest control experience. We have immediate openings for aggressive young men with sales ability and minimum of 2 to 3 years of structural pest control experience to manage offices. Liberal salary, commissions and over-rides enabling hard workers to earn $8-$10,000 annually. Many other company benefits. Must be available immediately. Write giving experience and small non-returnable photograph. Interviews in Pittsburgh at our expense. Write L. L. Crosby, President, Commonwealth Sanitation Co., 3567 Bigelow Blvd., Pittsburgh 13, Pa.

WANT TO BUY

WILL PAY TOP PRICE for exterminating business in New York City area. Cash. Replies confidential. Box 439. Pest Control magazine.

Answers to Pest-O-Gram No. 4 on page 50

M	i	g	R	a	t	i	o	M	B	b	L
A	Q	u	a	t	i	c	N	o	s	e	e
g	u	S	T	a	r	C	H	C	a	s	t
g	e	a	S	a	s	H	o	t	T	o	h
o	e	N	E	t	C	a	u	u	a	P	a
t	M	i	T	a	r	m	s	r	r	l	n
S	P	t	s	L	A	b	e	n	a	a	e
c	o	a	e	F	b	e	F	a	n	g	S
r	i	t	M	i	a	r	l	l	t	u	e
e	s	i	i	s	t	S	y	n	u	e	e
e	O	o	t	h	e	c	a	M	l	A	d
n	n	n	E	m	b	r	y	O	a	k	s

Busy Transit

When in flight, a housefly's wings beat 20,700 times a minute, according to the U. S. Department of Agriculture.

—Advertisers—

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Aegis Laboratories, Inc. 51
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American Smelting & Refining Co. 54
Associated Products, Inc. 12
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B. & D. A. Weisburger 39
Wood Treating Chemicals Co. . . . 43

K-State Research Grant

A $7,500 grant for research on use of fumigants to control stored-grain insects has been awarded Kansas State College in Manhattan by the Diamond Alkali Company of Cleveland, manufacturers of basic agricultural chemicals.

Studies will be concerned chiefly with new combinations of presently-used fumigants and with new formulations, Donald A. Wilbur, K-State entomologist who will direct the research, said.

The Original . . .

And Still The Best!

GETZ

POWDER BLOWER

$1.00 EACH

F.O.B.
St. Louis, Mo.

GETZ EXTERMINATORS, INC.

2234 OLIVE STREET ST. LOUIS 3 MO.

your own "Pest Control" library with

Permanent Binders

for 12 monthly issues of

PEST CONTROL

Still Just $2.75

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PEST CONTROL

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You Can MAKE MORE MONEY

by using and selling

FUMO-KILL

The New Effective Fumigant That Will Kill

Mosquitoes, Flying Moths, Spiders, Silverfish, Flies, Wasps, and Exposed Waterbugs, Roaches, Bedbugs, and Ants.

FUMO-KILL is truly the modern method of insect extermination. Light match to contents in can, will produce fumes — NO FLAME. Non-hazardous. This amazing FUMO-KILL insecticide has been tested, and found effective against most types of household pests.

FUMO-KILL has the following advantages:

EASY TO USE: Requires no Special Equipment. **ECONOMICAL TO USE:** Two ounces fumigates up to 6,000 cubic feet.

EFFECTIVE TO USE — Follow instructions on can for best results. **This Amazing FUMO-KILL insecticide is by all qualifications, a leader in its field.**

FUMO-KILL can be obtained in 2 oz. (enough for up to 6,000 cubic feet)—4 oz. and 1-lb cans.

Cost of 12—2-oz. Cans . . . $7.50 per doz.
Cost of 12—4-oz. Cans . . . $13.50 per doz.
Bulk . . . . . $4.50 per lb.

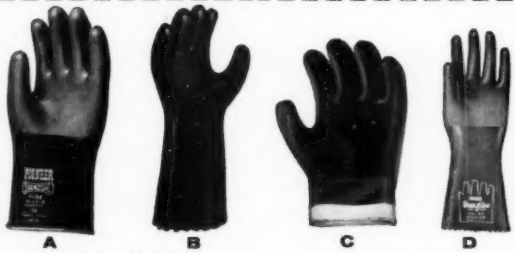
Delivery Charges Prepaid
For complete information write or phone today.

MAR-MEL PRODUCTS, INC.

Phone: Van Buren 6-2060-61

753 South Kedzie Ave. Chicago 12, Illinois

A PIONEER Liquid-Tight Glove For Every Pest Control Job



A. Stanzoil Black All Neoprene . . . . . 7 sizes, 5 lengths, 3 weights
B. Pacemaker Black Neoprene Coated Flannel . 2 styles, 4 lengths, 2 wgts.
C. Stanflex Blue Plastic Coated Jersey . . . Full and Palm-Coat, 3 styles
D. Stanflex Knit-Lined Red Plastic . . . 4 sizes, 11" length, medium wgt.

Mail This Coupon Today

The PIONEER Rubber Co.
247 Tiffin Road
Willard, Ohio, U.S.A.

N-35
140
5232
VL-34

Pioneers in Hand Protection
For Over 35 Years

Please send me:
- ☐ The name of my nearest PIONEER Glove Distributor.
- ☐ 1956-57 PIONEER Industrial Glove Catalog.
- ☐ Hand Protection Clinic glove recommendation for job described in enclosed letter.

Firm _____
Address _____
City _____ Zone ___ State _____
Signed _____

1500 WEST ELIZABETH AVENUE, LINDEN, NEW JERSEY

Immediate Openings

for Pest Control Operators with "Top" Experience in several of our

Caribbean Offices

Permanent and temporary positions available. High salaries, maintenance and transportation furnished. Unusual opportunities.

Write or Wire Immediately

L. L. Crosby, President
Commonwealth Sanitation Company
3567 Bigelow Boulevard
Pittsburgh, 13, Pennsylvania

Pestales

In spring, a young male's fancy . . . A Louisville, Kentucky criminal court in full session was invaded by swarms of flying termites responding to their spring mating instinct. Judge, jury and attorneys fled to an adjoining chamber where trial was resumed. *Next case: Call a termite operator.*

* * *

Achievement! Every PCO who's ever attended the conferences at Purdue University during the last couple of years knows it's been Donald L. Schuder who has taken care of the splendid room where equipment and entomological displays have been on exhibit. He's been an assistant in the department of entomology working on his doctorate degree. This year, June 2nd was the date, he finished his graduate study and received his Ph.D. The title of his thesis was "The Bionomics and controls for certain scale insects." Congratulations, Don. We'll miss seeing you at the Purdue Conference next year.

* * *

Court Caper: A comic opera feud between a large West Coast aircraft firm and a free-lance commercial artist, over an $85 bill for creation of a papier-mache mouse, has finally been settled. The artist had sued the company for that sum in Small Claims Court, contending that the multimillion-dollar corporation had refused to pay the bill. The company replied the mouse made by the artist, to advertise the firm's new "quieter than a mouse" airplane, was "loutish" in appearance and not "gentlemanly" as the specifications required. *Guess the aircraft firm should have commissioned Walt Disney.*

* * *

Termites to a Tee! Featured in the June 2 Sunday magazine section of the Washington, D. C. Star is a story and pictures of Dr. Thomas E. Snyder, the nation's leading authority on termites. Headed "Termites to a Tee," it describes Dr. Snyder's extensive research accomplishments.

* * *

Slaves to Culture. Italian entomologists have waged war on the African white termites that threaten the famous Pitti Palace in Florence, Italy, home of one of the greatest art treasures in Europe. *No cultural hypocrits these. That's what you call a genuine taste for art.*

* * *

PCO Globe-Trotter. From London comes a postcard from Lancaster, Ohio PCO L. M. Hines, Hines Industries, Inc. He says he has been in Spain and France for two weeks and is en route to Belgium, Germany, and Switzerland.

* * *

Eager Termites. Termites attacked the home of Robert Cribb, publisher of the Pratt, Kansas Tribune, before the residence was even built. "Termites were eating up the lumber in the yard before we could even get it into the framework of the house," he complained. "They were the flying kind which just flew by, liked my house idea and decided to move in before I did."

* * *

Where There's Smoke! Smoke hanging heavily in a downtown Greenville, North Carolina store recently alarmed passers-by. A policeman was summoned, and he, in turn, notified the fire department. But the fire department (it had been warned in advance to expect such a call) informed the patrolman Greenville's "firebug" was PCO Ivey Coward, Ivey Coward Exterminating Company. Coward was fogging the new store for wasps.

* * *

Story with a Moral: Termites were found to have eaten through a stock of pamphlets in the mail room of a large university, but not just ordinary pamphlets: these were entitled "Control of Termites!" *Moral: the best information is useless until it is put to work.*

* * *

He Meant Business. The following post card was sent to PCO H. O. Earnest, Terminix Service, Inc., Miami, Florida: "Gentlemen: Will you kindly have Chairman Ralph Procter of the Permanent Sub-Committee on Investigations of Subversive Infiltration into Hardwood Flooring convene an emergency session of the committee at 1828 S.W. 12th St., Miami, Florida, at earliest convenience. Thank you. (signed) R. L. Washburn."

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